ax lightness
CARBON FIBRE TECHNOLOGY

engage – THE ADVANTAGE IS YOURS

ASSEMBLY AND OPERATING INSTRUCTION

www.ax-lightness.de
www.engage-bikes.de

laminated
in germany

Some notes on this manual

Particular attention should be paid to the following symbols:

This symbol indicates an imminent risk to your life or health unless you comply with the instructions given or take preventive measures.

This symbol warns you of wrongdoings which may result in damage to property and environment.

This symbol marks information about how to handle the product or refers to a passage in the operating instructions that is particularly relevant.

The described possible consequences will not be repeated in the operating instructions every time one of the symbols appears.

Technical details in the text and illustrations of this manual are subject to change.

Text and concept:
Zedler – Institut für Fahrradtechnik und -Sicherheit GmbH
www.zedler.de

Photos:
AX-Lightness GmbH
and Zedler – Institut für Fahrradtechnik und und-Sicherheit GmbH

Edition 1, June 2013

Dear AX-Lightness and engage customer,

Congratulations for having purchased an AX-Lightness or engage component. You have made a very good choice. The AX-Lightness and engage team develops, tests and manufactures our products with dedication to uphold the highest standards of quality.

In case of any inquiries about your AX-Lightness and engage products please contact

AX-Lightness GmbH
Am Steinkreuz 12
D-95473 Creußen
Phone: +49 9270 91513-0
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www.AX-Lightness.de or
www.engage-bikes.de

General safety notes

Like all high-quality sports equipment, AX-Lightness and engage components require careful installation and are best left to an AX-Lightness and engage dealer. This is the only way to achieve optimum performance and long-term durability.

This manual cannot teach you the skills of a bicycle mechanic. Even a manual as big as an encyclopaedia could not describe any possible combination of bicycle models and components or parts on the market. It therefore focuses on your newly purchased components and provides useful information and warnings.

We therefore strongly recommend that you ask a qualified mechanic at your AX-Lightness and engage shop for help.

We recommend not to combine AX-Lightness and engage components with other components to achieve optimum performance and durability for your product.

If you intend to combine the components with components from other manufacturers, make sure they are compatible, i.e. that all dimensions are exactly the same according to the specifications given in this manual. Our precise tolerances are intended to ensure component compatibility, and are carefully monitored during production and quality control so that the assembly will be easy and proper.

This manual contains important notes about use, care, maintenance and installation.

Be sure to first read carefully the general information of this user manual and then the chapter providing you with information on the AX-Lightness and engage component you have purchased. Then, nothing will stand in the way of a smooth assembly and a trouble-free use.

Keep this user manual for your records and future reference and share it with the new user, if you sell, lend or leave the AX-Lightness or engage bicycle or component to anybody else.

All AX-Lightness and engage components, like all lightweight components, require special care and attention. Therefore, make sure to carefully assemble the components and to only use them for their intended purpose.

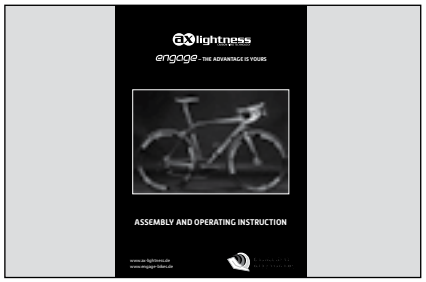
The material used by AX-Lightness and engage, especially carbon (also referred to as CRP), is extremely strong and durable, i.e. the components are very durable, as the material combines high resistance with low weight. It is, however, important to know that these materials are relatively brittle, which means that AX-Lightness and engage components are more likely to break than to bend.

Overstrained material can lead to internal damage that may hardly show up. There will be no visible signs of damage, such as deformations or the like, as known from other metals, e.g. aluminium.

After undue stress, e.g. following an accident, AX-Lightness and engage components can fail. This can lead to a fall with possibly serious health consequences. For this reason you must observe the control notes in the chapter providing you with the information on the component purchased by you. To ensure safe use following a possible loss event, make sure to have the components concerned checked by an AX-Lightness and engage dealer. In such a case always ask your AX-Lightness and engage dealer for professional advice.

Enjoy your ride and have fun with your AX-Lightness and engage products!

Your AX-Lightness and engage team



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Before your first ride – Intended use

AX-Lightness and engage brakes and brake pads, rims, rim tape and wheels, quick-releases, forks and headsets, cranksets, pedals, handlebars and stems **(a)** as well as seat posts and saddles **(b)** are designed for use on road and triathlon (i.e. time trial), cyclocross and mountain bikes and their typical use.

Road racing, **triathlon** and **time trial bicycles** are exclusively designed for cycling on tarred and hard-surface tracks with a smooth surface.

Cyclocross bicycles (c) are designed for off-road cycling over typical cyclocross terrain, e.g. on field tracks and forest trails; they are, however, not suitable for all-mountain and enduro use, downhill (DH) riding, freeriding, dual slalom, downhill/freeride parks, jumps, drops etc.

Mountain bikes (d+e) are designed to be used for off-road cycling and for riding over natural terrain (e.g. terrain of a mountain bike marathon and cross-country racing). Due to their design and equipment they are, however, not intended to be used on public roads. Before being used, they must be fitted accordingly.

Our components are designed for common cross-country, marathon and all-mountain bikes. They are not suitable for freeriding, dual slalom, downhill riding, jumps or the like. There are special mountain bike components for these purposes. Ask your AX-Lightness and engage dealer.

Never make any changes to handlebars, bar ends and stems, forks and headsets, wheels, rim tapes or brake pads of your AX-Lightness and engage bicycle. Never modify or make any changes to AX-Lightness and engage seat posts, saddles, pedals or cranks. Do not file or drill holes in AX-Lightness and engage components, especially not in carbon components, as it will compromise their structural integrity and void your warranty.

For more information see the specifications in our catalogue and/or visit us at our website www.AX-Lightness.de or www.engage-bikes.de

AX-Lightness and engage forks and stems are designed to be only used with threadless headsets, also referred to as Aheadset®-headsets. Attempting to use them in combination with quill-stems and threaded steerer tubes can lead to sudden failure, resulting in a crash with unforeseeable consequences.

Make sure when performing any adjusting to your AX-Lightness and engage bicycle that the brake levers or brake/shift levers are always within easy reach. Keep in mind that the brake levers are not within easy reach when you ride with your hands on bar ends mounted to AX-Lightness Poseidon handlebars especially reinforced for this purpose or to engage Chord risebars or engage Chord flatbars.

If you are in doubt or if you have any questions, contact your AX-Lightness and engage dealer.

After a crash, accident or other major impact, have your AX-Lightness and engage wheels, fork, headset, saddle, seat post, stems and, if necessary, the bar ends or aero bars checked and, if necessary, replaced by your AX-Lightness and engage dealer for your own safety.

Do not use your bicycle, but get in touch with your AX-Lightness and engage dealer, in case:

» the AX-Lightness and engage wheels, quick-releases, crank, fork, headset, handlebars, stem, bar ends or aero bars give out cracking or creaking noises or
» the mentioned AX-Lightness and engage components show external damage, such as notches, cracks, dents, discolorations etc.

Ask your bicycle dealer to check the AX-Lightness and engage components thoroughly and to replace them, if necessary.

Aero bars are not allowed. If you want to fit your bicycle with aero bars (clip-on), AX-Lightness offers custom-made handlebars.

engage products are designed for an overall load of 110 kilos (242 lbs) including rider and baggage, e.g. rucksack.

The overall load of AX-Lightness products is marked on the components. Upon request AX-Lightness offer reinforced components withstanding heavier overall loads.

Be sure to use the AX-Lightness and engage bicycle only for its intended purpose, as it may otherwise not withstand the stress and fail! Risk of accident!


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Before every ride

Check the following points before setting off on your AX-Lightness and engage bicycle:

1. Verify the tight fit of the stem on the fork steerer and of the handlebars in the stem. For more information see chapters **"Mounting AX-Lightness and engage Aheadset®-stems"** and **"Mounting AX-Lightness and engage handlebars".**

2. Are the quick-release levers or nuts of the front and rear wheel and of the seat post properly closed **(a)**? Improperly closed quick-releases or thru axles can cause the wheels of AX-Lightness and engage bicycles to come loose. and result in serious accidents! For more information see chapters **"Quick-releases", "Thru axles"** and **"Wheel mounting (mountain bike/road racing bike)"**.

3. Are the tyres in good condition and do they have sufficient pressure **(b)**? Do at least a thumb test by pushing your thumb down on the tyre. The tyre should only yield a little. For more information see chapter **"Tyres, inner tubes, rim tape, inflation pressure".**

4. Check whether the AX-Lightness and engage headset is free of play and moves easily **(c)**. Perform a functional check as described in chapter **"Checking the headset"**.

5. Spin the wheels to check whether the rims are true. Watch the clearance between brake pad and rim **(d)**, or, in the case of disc brakes, between rim and frame or fork. Untrue rims can be an indication of tyres with ruptured sides, broken axles and a damaged rim. As you look over the bicycle and find out that in the brake/wheel area the clearance on the right side differs from that on the left side, the AX-Lightness and engage wheel or the brake has come out of its centred position.

6. Test the brakes in stationary by firmly pulling the brake levers towards the handlebars **(e)**. The brake pads of the rim brakes must hit the rim sides with their entire surface. They must not touch the tyres. You should not be able to pull the lever all the way to the handlebars!

   With disc brakes you should have a stable pressure point at the lever. Oil or brake fluid must not leak out onto the rotor or stopping power will be reduced and cause unsafe braking performance. For more information, see your general bicycle user manual.

7. Let your AX-Lightness and engage bicycle bounce on the ground from a small height **(f)**. If there is any rattling, see where it comes from. Check the bearings and the bolts, if necessary.

8. Do not forget to take a high quality D- **(g)** or chain lock with you on your ride. The only way to effectively protect your AX-Lightness and engage bicycle against theft is to lock it to an immovable object.

9. If you want to ride on public roads, make sure your AX-Lightness and engage bicycle is equipped according to the regulations of your country **(h)**. Riding without lights and reflectors in dark or dim conditions is very dangerous, because you will be seen too late or not at all by other road users. A lighting set that corresponds to the regulations is a must on public roads. Turn on the lights as soon as dusk sets in.

Please note that the braking effect and road grip of your bicycle are both greatly reduced in wet conditions. Be particularly cautious and do not ride as fast as under dry conditions.


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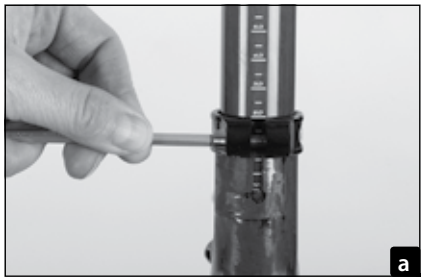
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Braking on fast and steep descents can cause your wheels to heat up, possibly damaging the tyres, tubes and rims. In the worst case this can result in a sudden loss of air and thus in a serious accident. Get used to proper braking and let the brakes cool down from time to time.

Do not use your AX-Lightness and engage bicycle, if it fails on one these points! Riding a defective bicycle can result in serious accidents! If you are in doubt or if you have any questions, contact your AX-Lightness and engage dealer.

Improperly closed fastenings **(a-c)** can cause components of AX-Lightness and engage bicycles to come loose and result in serious accidents!

During use your AX-Lightness and engage bicycle is undergoing stress resulting from the surface of the road and through the rider's action. Due to these dynamic loads, the different components of your AX-Lightness and engage bicycle react with wear and fatigue. Please check your bicycle regularly for wear marks, scratches, deformations, colour changes and any indication of cracking. AX-Lightness and engage components which have reached the end of their lifespan may break without previous warning.

Be aware that the distance you need to stop your bicycle increases, when you are riding with your hands on aero bars or bar ends. The brake levers are not always within easy reach.

Let your AX-Lightness and engage dealer maintain and service your bicycle regularly and in cases of doubt it is always best to replace parts.

Read the general user manual **(d)** of your bicycle manufacturer before you set off!

Special characteristics of carbon

All AX-Lightness and engage products made of carbon fibre-reinforced resin, also referred to as carbon or abbreviated CFR **(e-g),** require special care and attention.

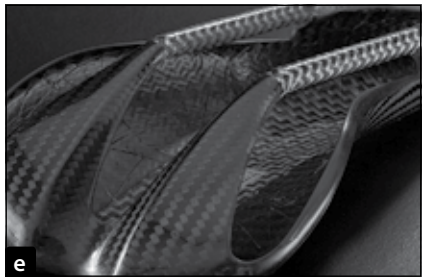
Carbon is an extremely strong material which combines high resistance with low weight.

Please note that carbon, unlike metals, shows no visible deformation after undue stress even though some of its fibres may be damaged. This makes it very dangerous to continue using an AX-Lightness and engage carbon component after an impact or undue stress, as it may fail without previous warning, thereby causing an accident with unforeseeable consequences.

If your AX-Lightness or engage carbon component sustained this kind of impact or undue stress, we strongly recommend that you take your complete bicycle to your AX-Lightness and engage dealer for inspection. They will check the damaged bicycle and, if necessary, replace the defective component. If necessary, your AX-Lightness and engage dealer will contact the service centre directly.

For safety reasons, damaged AX-Lightness and engage components made of carbon **(h)** must never be repaired! They must be replaced at once! Make sure damaged components will not be re-used. Destroy the component to prevent any re-use by a third party.

AX-Lightness and engage components made of carbon must under no circumstances be exposed to excessive heat. Therefore, never have a carbon component enamelled or powder-coated. The temperatures required for these treatments could destroy the components. Do not leave AX-Lightness and engage carbon components near a source of heat, or in a car during hot or sunny weather.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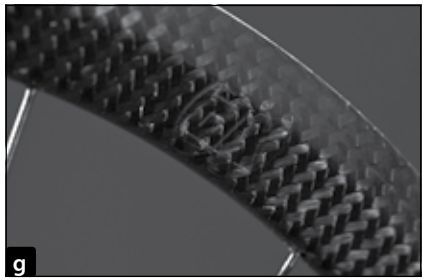
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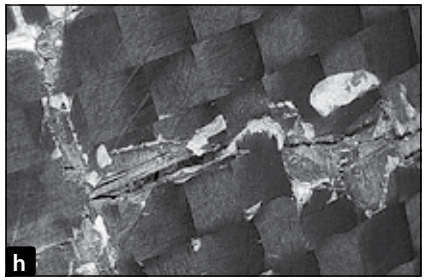
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Components made of carbon have like all lightweight components only a limited service life. Therefore, to be on the safe side it is recommended that you replace AX-Lightness **(a)** and engage handlebars, stems and headsets depending on use at regular intervals (e.g. every three years), even if they were not involved in an accident or similar incident.

Make sure the clamping areas are absolutely free of grease and other lubricants, especially when the clamping surfaces are made of carbon or carbon-fibre reinforced plastics! Grease will penetrate the surface of the AX-Lightness and engage carbon component and undermine the stability of joined parts by reducing the coefficient of friction. Once greased, AX-Lightness and engage carbon components may never again ensure reliable clamping!

When you install AX-Lightness and engage carbon components, apply AX-Lightness carbon assembly paste **(b)** to interconnecting surfaces to increase friction. This will allow you to tighten bolts to low and therefore gentle torque values. If any notches, tears, dents or discolorations etc. are visible on your AX-Lightness and engage carbon component, or if it makes creaking or cracking noises, do not use the bicycle until the component has been replaced! After undue stress, a crash or other major impact, replace the component or have it inspected by an AX-Lightness and engage dealer.

If you have AX-Lightness or engage carbon road handlebars, do not use clip-on or aero parts, unless the handlebars are especially reinforced for these parts.

Please note that rims with carbon braking surfaces **(c)** need special brake pads. AX-Lightness and engage recommend that you use BBB brake pads, models BS-03AC for Shimano and SRAM brakes and BS-03CC for Campagnolo brakes or Ashima cork carbon brake pads.

You need to get used to the braking response of carbon rims. A carelessly actuated front wheel brake **(d)** can lead to a fall. Before you set off for the first time be sure to practise using the brakes off public roads.

Cleaning and care

Clean the AX-Lightness and engage tyres, wheels, handlebars, stem, grips, grip tape as well as fork, headset, seat post and your saddle with water and a soft rag at regular intervals **(e)**. If necessary, use a non abrasive soap to remove grime. You may add a little washing-up liquid for cleaning and removing tough stains, such as oil or grease, from hard surfaces. Do not use degreasing agents, which contain organic solvents (such as acetone, trichloroethylene, methylene). Chemicals of this sort may damage the finish or substructure of the material.

After your AX-Lightness and engage bicycle has dried, you should apply a wax based polish to painted, carbon and metal surfaces (exception: braking surfaces and saddles) **(f)**. Polish the AX-Lightness and engage components after the wax has dried. With this treatment your AX-Lightness and engage wheels, fork, headset, handlebars, stem and seat post will keep their nice appearance for years.

While cleaning your AX-Lightness and engage bicycle and components, watch out for cracks, scratches, dents, as well as for deformed or discoloured material. If you are in doubt contact your AX-Lightness and engage dealer and have the damaged components replaced at once.

Make absolutely sure to keep the braking surfaces or rotors free of cleaning agent, grease or oil. Otherwise the braking performance might be drastically reduced or even rendered ineffective.

Be sure to never store the AX-Lightness and engage handlebars, stem, wheels, tyres, fork, seat post, saddle, frame and headset in the blazing sun or near a source of heat. When storing your bicycle for the winter period, make sure the tyres have enough pressure.

Check the tyre pressure **(g)** at regular intervals and follow the recommendations of AX-Lightness and engage.

Do not use any aggressive agents, such as benzine, thinners, etc., for the cleaning of AX-Lightness and engage wheels and tyres.

Loose or overly tightened bolts may result in an accident!

Maintenance

Check the true running of the rims, the bolts of the sprocket assemblies and the play of the bearings after the first 100 to 300 km (60 to 180 miles) and true the AX-Lightness and engage wheels **(a)** and/or adjust the bearings, if necessary.

Check the torque values of all bolts **(b)** after the first 100 to 300 km (60 to 180 miles) or 10 to 20 hours of use. If necessary, tighten the bolts by approaching the maximum torque prescribed by AX-Lightness and engage in small steps and check in between the proper fit of the AX-Lightness and engage component **(c)**. Never exceed the maximum torque value indicated by AX-Lightness! Re-check the bolted connections every 2,000 km (1,200 miles) or 100 hours of use!

Although the AX-Lightness and engage headsets have seals, they are not entirely tight. Therefore, have the headset dismounted and re-lubricated by an authorized AX-Lightness and engage dealer at least once a year, depending on the intensity of use **(d)**.

Please note that truing wheels and adjusting bearings are jobs best left to skilled mechanics. Ask your AX-Lightness and engage dealer to do these routines.

After about three years the tyres and inner tubes, the handlebars, stem and bar ends have aged to an extent that they need to be checked thoroughly and have to be replaced, if necessary. Ask your AX-Lightness and engage dealer.

If your AX-Lightness and engage bicycle has rim brakes, have the thickness of the sides of clincher rims measured after the second set of brake pads at the latest. If the thickness is found to be less than 1 mm, have the rims replaced!

The hubs rotate on hermetically sealed, replaceable industrial bearings. Replacing the bearings requires some experience. We therefore advise you to leave this job to your AX-Lightness and engage dealer.

General notes on mounting and compatibility

In general, mounting stems, handlebars, grips, wheels, cranksets, forks, headsets, seat posts, saddles and tyres as well as the replacement of brake pads are jobs for a skilled mechanic. Have this work done by an authorized AX-Lightness and engage dealer for your own safety. Be sure to strictly observe each of the following instructions. Non-observance of these instructions can lead to the failure of AX-Lightness and engage components, resulting in a severe accident or injuries.

Installing non-matching components can also result in bolt failure and consequently in a bad fall.

We recommend that you use the following AX-Lightness and engage components, as they are designed to fit and function as an integrated whole: seat post and saddle **(e)**, fork and headset **(f)**, stem and handlebars **(g)**, wheels and brake pads **(h)**.

If you decide to use a component from another manufacturer and to combine it with an AX-Lightness and engage component, read the user manual of this component regarding size accuracy to ensure proper fit and usability with AX-Lightness and engage components.

AX-Lightness and engage assume no responsibility for problems resulting from an AX-Lightness and engage component being used with a component from another manufacturer.

AX-Lightness and engage strongly advise against using stems with a large recess in the steerer clamp pointing towards the stem. The top and bottom collar of the steerer clamp must measure 5 mm at least. Stems with recesses on the rear side of the steerer clamp are unsuitable!

Damaged AX-Lightness and engage components must not be re-used! If you are in doubt, we recommend that you replace the component. Do not use your bicycle until this has been done.

For a secure clamping force, apply AX-Lightness carbon assembly paste to interconnecting surfaces to increase friction.

Before installation watch out for sharp edges and burrs in the seat tube of the frame **(a)**, at the seat post clamp and the saddle clamping, in all clamping areas of the fork, the headset, the stem, the handlebars and, if necessary, on the handlebars approved for bar ends. Do not use these components, if they have burrs or sharp edges. Have components from any manufacturer with sharp edges or burrs checked by your AX-Lightness and engage dealer. They will see, whether this is a problem that can be solved or whether the component has to be replaced.

Using a torque wrench

To achieve a reliable clamping of two components, AX-Lightness and engage consider the use of a torque wrench **(b)** absolutely necessary.

Exceeding the maximum torque value on clamp bolts of the AX-Lightness and engage stem, head tube or handlebars creates too much clamping force. This can lead to a failure of the AX-Lightness and engage component and not only bears the high risk of an accident, but also voids the warranty.

Loose or overly tightened bolts can result in component failure and in an accident. Strictly observe the torque specifications of AX-Lightness and engage **(c)**.

If you do not have a high-quality torque wrench, contact your AX-Lightness and engage dealer.

Do not use components, if you are not absolutely sure about their compatibility. If you are in doubt contact your AX-Lightness and engage dealer. If necessary, they will get in touch with our AX-Lightness and engage service centre.

Warranty terms

Under European consumer law, the purchaser has full statutory warranty rights within the first two years from date of purchase. In North America, these rights apply to the first year from the date of purchase. According to these laws, your AX-Lightness and engage dealer is responsible for ensuring the product is free of defects that could cause premature wear from normal use.

The European sales law guarantee is only valid in states where European legislation applies. Please ask your AX-Lightness and engage dealer about the regulations in your country.

Warranty claims will only be accepted, if the bicycle has been used solely for its intended purpose (see chapter **"Before your first ride – Intended use"**).

It does not cover damage resulting from wear (wear of saddle cover, lubricants, seals, wear of bar tapes and grips, tyres, brake pads and braking surface of the rim in the case of rim brakes), neglect (insufficient care and maintenance), accidents, overstress caused by overloading, overstress due to an over-tightening, incorrect installation, improper treatment or as a result of modifications made to the AX-Lightness and engage component.

Be sure to strictly follow all installation instructions (especially torque values), maintenance instructions as well as all additional instructions provided by the manufacturers of products used in conjunction with AX-Lightness and engage products.

Observe the indicated behavioural and control procedures as well as all instructions referring to the replacement of safety-relevant components, e.g. in the case of colour changes and cracks occurring on the components etc.

Keep the user manuals of all safety-relevant components for your records and future reference.

Your AX-Lightness and engage dealer is your direct contact point for all issues in this user manual. They will gladly answer comprehensively to your questions.

In the event of a defect or if you have a warranty issue, please contact your AX-Lightness and engage dealer who sold you the AX-Lightness and engage product in question.

AX-Lightness and engage have exclusive agreements with all reseller partners to handle warranty cases. If you purchase an AX-Lightness and engage product from an unauthorized reseller, e.g. an auction site on the internet, you are not entitled to recovery from AX-Lightness or engage. In this case you must contact the reseller.

You must include your original proof of purchase when initiating your claim.

A note on wear

Bicycles components are subject to wear due to normal and proper use. The wearing rate depends on care and maintenance, bicycle usage and environmental conditions, such as UV light, rain, mud, dust, and sand.

Some AX-Lightness and engage components require regular care and maintenance. But even with the best maintenance all components will reach sooner or later the end of their service life, depending on the intensity and the conditions of use.

The following AX-Lightness and engage components are especially subject to wear due to the nature of their intended use and not covered for wear under this warranty:

- The covering material of saddle that is subject to compression, abrasion and soiling.
- The brake pads **(a)** and the braking surfaces of the rims **(b)**: Once the yellow marks are visible on the braking surfaces, the rim must be replaced.
- The chainrings of the crankset **(c)** wear through abrasion caused by the chain and stone chippings.
- Grips and bar tape **(d)** are subject to compression, abrasion and soiling.
- The lubricants and seals of the bearings.

Terms of guarantee AX-Lightness and engage

AX-Lightness and engage Crash Replacement

Accidents and falls can result in damage due to the high forces of impact. This affects functionality and in some cases even the safety of AX-Lightness and engage components.

For this reason in 2011 we introduced our Crash Replacement programme for first owners (the person who bought the product from us or one of our distributors) that covers all parts for a period of four years from the date of purchase.

Crash Replacement means: It doesn't matter whether you had a hard fall or an accident, whether your AX-Lightness and engage product is no longer in working order due to excess stress, or whether for any other reason the functionality of the part or your safety is compromised, AX-Lightness and engage will give you a discount of up to 30% off the purchase price for a new part.

We will still meet our warranty obligations through our AX-Lightness and engage distributor, at no cost if the damage is already covered by our warranty.

We will repair the damage for you if repairing the damage not covered by warranty is less expensive than Crash Replacement. We offer this service so that you can enjoy your high-quality carbon components again as quickly as possible. We reserve the right to inspect damage and decline Crash Replacement if we determine that the damage was caused wilfully, through improper use or if the damage is only of an optical nature.

Terms and conditions of Crash Replacement

Crash Replacement works like this:

The damaged part can only be replaced by an identical part.

Crash Replacement can only be claimed within a period of four years after the date of purchase by the first buyer.

In the first two years after purchase the discount is 30%; in the third and fourth year 20%.

Crash Replacement does not cover wilfully caused damage or damage as a result of improper use.

To claim Crash Replacement simply send the damaged AX-Lightness or engage item with a complete damage report and a copy of the invoice to AX-Lightness or engage.

Please note: The end customer, not the dealer, must send in the item!

Please clearly and concisely describe how the damage was caused. This information is important so that we can use it as a reference point when we inspect the parts.

Crash Replacement is a voluntary service from AX-Lightness and engage. We reserve the right to make changes to these terms and conditions.

In case of any inquiries, please contact our AX-Lightness and engage service centre. For more information visit us at www.AX-Lightness.de or at www.engage-bikes.de

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This user manual is sub-divided into "component chapters" referring to the AX-Lightness and engage components. This user manual has edge indices which help you to quickly find the desired chapter.

BRAKES

General notes on mounting and compatibility

Brakes **(a+b)** are used for adjusting one's speed to the surrounding terrain and traffic. In an emergency situation, the brakes must bring the bicycle to a halt as quickly as possible. In the event of such emergency braking, the rider's weight shifts forward abruptly, thus reducing the load on the rear wheel. The rate of deceleration is thereby limited by the danger of the rear wheel losing contact with the ground and by the loss of the tyres' grip on the road. This can lead to an overturning of the bicycle **(c)**. Such a problem becomes particularly acute when riding downhill. Therefore, in case of an emergency braking you must try to shift your weight back and down as far as possible.

Actuate both brakes simultaneously and bear in mind that, due to the weight transfer, the front brakes can generate a far better braking effect on a surface with good grip. Wet weather reduces the braking power. Actuate the brakes carefully when riding on wet or slippery ground, as the tyres can easily slip away. Therefore, reduce your speed when riding in such conditions. Prolonged braking or permanent dragging of brake pads can lead to overheating of the rims in the case of rim brakes. This can damage the inner tube or make the tyre slip on the rim This can damage the inner tube or make the tyre slip on the rim. **Risk of accident!**

When riding downhill, get used to braking hard and then releasing the brake again, whenever the road surface and the situation allows for it. If you are in doubt about the braking action, stop and let the brake system cool down.

The assignment of brake lever to brake calliper can vary, e.g. left lever acts on front brake **(d)**. Ask your AX-Lightness and engage dealer to change the brakes as you want them.

Be careful while getting used to the AX-Lightness and engage brakes. Be careful while getting used to the AX-Lightness and engage brakes. This can save you from having accidents.


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Wet weather reduces your braking power and the road grip of the tyres. Wet weather reduces your braking power and the road grip of the tyres.

Ensure that braking surfaces and brake pads are absolutely free of wax, grease and oil **(a)**. Risk of accident!

When replacing any parts, be sure to only use parts that bear the appropriate mark and, to be on the safe side, original spare parts **(b)**. Your AX-Lightness and engage dealer will be pleased to help you.

If you need full braking power in a sudden situation of danger, there is the risk already with slightly worn down brake pads that you can pull the brake levers all the way to the handlebars. There is no chance for the theoretically maximum possible delay effect to be built up. Regular checks of the free travel of the brake lever **(c)** and readjustment are therefore mandatory.

Compatibility

The leverage of AX-Lightness and engage brakes is best with SRAM **(c)** and Campagnolo **(d)**.

If you use the brake levers of other manufacturers, the brake may not reach the necessary braking power.

If you want to combine these AX-Lightness and engage brakes with the latest Shimano levers **(e),** the braking power may also be reduced.

As the braking performance depends on many factors (cable length, cable routing, brake pads / rim combination, height of the brake pads in the brake pad holder), other brake levers apart from SRAM and Campagnolo may also work. Please ask your AX-Lightness and engage dealer or even better an independent institute to check this.

AX-Lightness and engage recommend that you use high-end brake cables of one of the leading suppliers. It is recommendable to use the brake cables delivered with your brake levers.

In principle, you can use all brake pads designed for Shimano and SRAM brake pad holder. Always keep the rims **(f)** in mind, when choosing the bake pads and observe the specifications of the wheel manufacturer.

Use different brake pads for aluminium rims **(g)** and carbon rims **(h).**

For AX-Lightness and engage rims and wheels we recommend that you use BBB brake pads, models BS-03AC for Shimano and SRAM brakes and BS-03CC for Campagnolo brakes or Ashima cork carbon brake pads.

The brakes are vital to your safety. Do not compromise when it comes to the brake cables and brake pads on your bicycle. The brake may be reduced in its performance or even rendered ineffective.

When combining AX-Lightness and engage brakes with other road racing or time trial machine brake levers than Campagnolo or SRAM brake levers, you must check whether maximum brake performance is given even in case of an emergency braking under difficult conditions. AX-Lightness and engage advise against using other combinations than the mentioned ones without adequate checks.


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Operation and wear

Actuating the levers on the handlebars **(a)** and the cables causes a brake pad to be pressed against a braking surface **(b+c)**, and the ensuing friction slows down the wheel. If water, dirt or oil comes into contact with one of the braking surfaces, this changes the coefficient of friction and deceleration is reduced. This is why brakes respond with a slight delay and less powerfully in wet weather.

In order to maintain their effectiveness, the AX-Lightness and engage brakes need to be checked and re-adjusted regularly.

The friction generated by braking causes wear to the brake pads as well as to the rims. Frequent rides in the rain and dirt and over hilly terrain can accelerate wear on both braking surfaces. Some rims are provided with wear indicators, e.g. grooves or circular indentations. Once these are visible (e.g. yellow marks on the braking surfaces), the rim must be replaced. When the abrasion of the rim has reached a certain critical point, the rim may break under the tyre pressure. This can make the wheel jam or the inner tube burst, both of which can cause an accident! **Risk of accident!**

Functional check

Check whether the brake pads are accurately aligned with the rims **(d)** and still sufficiently thick. You can judge the wear of the brake pads by the appearance of grooves. If the pads are worn down to the bottom of the grooves, it is time to replace them **(e)**. Be sure to observe the appropriate instructions of the respective manufacturer.

See your AX-Lightness or engage dealer and ask them to examine the remaining thickness of the rims when you have worn through your second set of brake pads with an aluminium rim at the latest. Your bicycle dealer has special measuring devices for determining the remaining thickness of the rims.

Both brake arms must hit the rim simultaneously, when you actuate the brake lever. They must keep off the tyre.

The brake lever must always remain clear of the handlebars. You should not even be able to pull it all the way to the handlebars **(f)** in the event of an emergency braking. If this is the case, however, observe the following chapter **"Synchronising and readjusting the brakes"**.

A correctly adjusted AX-Lightness and engage brake must have passed all these checks.

Brake cables that are damaged (g), e.g. frayed, should be replaced immediately, as they can otherwise fail at a critical moment, possibly causing an accident.

Adjusting the position of the brake pads relative to the rims requires a considerable degree of skill. Replacing and adjusting the brake pads is a job best left to your AX-Lightness and engage dealer.

Have your rims regularly inspected and measured by your AX-Lightness and engage dealer (h).


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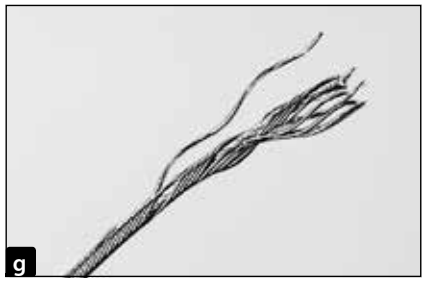
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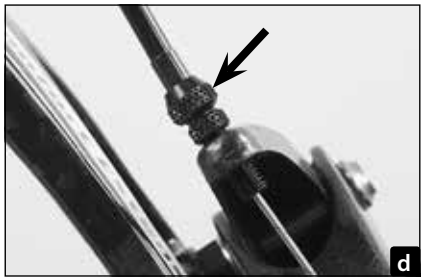


Brake adjustment and maintenance

Synchronising and readjusting the brakes

To adjust the brake pads in parallel to the braking surfaces of the rims, place a flat 12 mm open-ended wrench to the wrench surfaces directly behind the brake arms **(a)**.

Keep the brake fixed with the tool and check with a torque wrench and a 6-mm bit, whether the sleeve nut with which the brake is connected to the frame is still tightened to a torque of 2 to 3 Nm **(b)**.

The position of the brake lever where the brake starts to act, also referred to as pressure point **(c)**, can be adjusted to the size of the hand as well as to individual convenience by readjusting the brake cable. Make absolutely sure you cannot pull the brake lever all the way to the handlebar grip. With an unapplied brake the brake pads should not be too close to the rim sides, otherwise they could drag along the rim during riding.

Prior to this adjustment, read the relevant instructions in your general bicycle user manual or the manuals of the component manufacturers Campagnolo, SRAM or Shimano.

With ongoing brake pad wear, the pressure point at the brake lever moves towards the handlebars. Check the free travel at regular intervals. It should not be longer than a quarter of the whole travel.

For readjustment turn the knurled bolt **(d)** through which the cable runs into the brake body anticlockwise until the lever has the desired travel.

Hold the bolt tight **(e)** and screw the knurled nut downwards until you feel resistance. This countering with the fingers has a self-locking effect, thus fixing the adjustment.

Test the brakes subsequently in an area free of traffic.

A decreasing braking performance can also be caused by soiled rims and brake pads. In such a case, clean the braking surfaces of aluminium rims with a soft rag and benzine or with a special rim cleaning rubber. The braking surfaces of carbon rims should be cleaned carefully by using a little acetone. To remove dirt from the brake pads, use emery paper and rub off the top layer.

Scraping noises during braking indicate impurities sticking in the brake pads which must be removed at once. Small stones as well as very hard components of the brake pad can scratch out aluminium particles from the surface of an aluminium rim. The rim wears down quickly and the braking performance decreases. In the case of carbon rims the top layer can be affected.

Always test the brakes' function when stationary **(f)** after adjusting them, making sure the brake pads engage fully with the rim without touching the tyre **(g)** when you pull them hard. Make sure you cannot pull the lever all the way to the handlebars **(h)**.

Be sure to first practise using the brakes away from normal road traffic to get used to the changing braking response and to achieve full braking performance of the brake pads.


a


b


c


d

Replacing brake pads

For dismounting the brake pads unscrew the adjusting nut of the re-tensioning unit at the AX-Lightness and engage brake calliper. Relieve the brake calliper, by pressing together both brake arms with one hand and unhooking the entire brake cable fixing with the other hand **(a)**, as you usually do when dismounting a wheel. If you have Campagnolo brake lever/shifter units, you can slacken even more at the lever **(b)**. Release the brake pad bolts.

On the rear wheel brake pad replacement works with the brake pad holder mounted; on the front wheel it will be better to unscrew the entire brake pads.

Unscrew the entire brake pad holders with a T25 Torx-wrench on the rear brake **(c)**. Do not forget to wipe clean the brake and the brake pad holder on this occasion.

Release and remove the bolts on the brake pad holder outside with a 2 mm Allen key on the front and rear wheel **(d)**. If you have other brake pad holders, remove the pin by pulling it out upwards **(e)**. Remove the brake pad and observe both the contour and the direction of the arrow.

Slide a sufficiently thick brake pad of identical shape that matches the rim type onto the pad holder **(f)**. For AX-Lightness and engage carbon rims we recommend that you use BBB brake pads, models BS-03AC for Shimano and SRAM brakes and BS-03CC for Campagnolo brakes or Ashima cork carbon brake pads. If you have rims of other manufacturers, be sure to observe their instructions. Secure the brake pad with a new bolt treated with locking agent. If there are no bolts added to the new brake pads, apply some liquid locking agent on the already used bolt.

A washer indented on one side **(g)** is inserted between brake pad holder and brake calliper. Due to their ball-shaped form of these components, the brake pad is flush with the braking surface. To adjust the perfect angle, tighten the bolt including washer only slightly and slide the brake pads in to the desired position. The brake pad must not project beyond the rim's braking surface neither to the tyre nor to the spokes

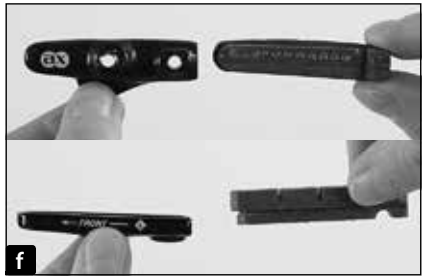
When mounting the brake pads to the brake, be sure to check its alignment **(h)**. In direction of motion, the holders must be closed in the front and open in the rear, which presses the brake pad into the holder rather than pulling it out! In addition, the bend must fit the run of the rim.

Pull the brake lever to hold the aligned brake pads in their position. Use a torque wrench to tighten the bolts to a torque value of 4 Nm.

If your brakes make squeaking noises, adjust the brake pads in a way that the front part of the brake pad hits the rim first. In this case, tightening with the brake lever being pulled doesn't work. You must fix the brake pad by hand.

Hang the brake cable fixing unit back in its mount **(a)**. Retighten the release device that you have possibly loosened before starting the replacement. Check the gap between the brake pads and the rim sides as well as the functioning of the brake. If necessary, re-adjust the travel of the brake lever or the position of the brake pad in case of different gaps to the rim, as above described, on the AX-Lightness and engage brake calliper.


e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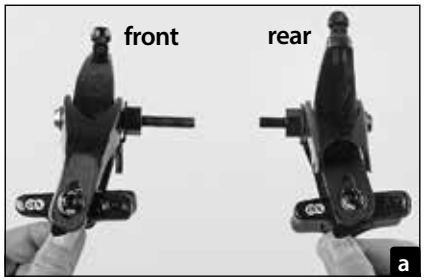


Mounting brakes and brake cables

Bowden cables transmit the rider's signals between the brake levers/shifter units and the brakes. It is not least the net brake mounting and cable routing which makes for a perfect functioning of the brake.

Unscrew the sleeve nut from the brake fastening bolt. Slide the AX-Lightness and engage brake with the long bolt into the fork and that with the short one into the rear frame **(a)**. Insert the grease-free sleeve nut from behind into the fork and screw it slightly onto the brake bolt **(b)**.

Use a 6 mm Allen key to screw the nut fully to the end. A secure fixing is achieved with 8 to 10 full turns; by then you should feel a resistance. If you do not feel a resistance, you must use a longer sleeve nut. Ask your AX-Lightness and engage dealer for advice.

Bring the AX-Lightness and engage brake in a symmetrical position and tighten the sleeve nut to a torque value of 2 to 3 Nm by using a torque wrench **(c)**.

Pull the brake lever to the handlebars and slide the cable through the brake lever and in the rear through the borehole in direction of the handlebars. Check the proper position of the cable mount in the brake lever and make sure the nipple engages in the recess. The largest opening range for Shimano levers is achieved by first releasing the shift lever and then by moving it entirely inwards, as you do when shifting.

Slip the outer brake cable housing over the brake cable and move it from the handlebar side into the brake lever until it stops inside **(d).** Do not use cable stops! Keep in mind that a coat of grease is applied by Shimano inside the cable housings on the side with the lettering. The lettering should therefore show to the grips.

Route the cable housing in the front along the handlebars and, if available, along the crimp to the thickened are beside the centre of the handlebars. This is where the bar tape ends later on and the cable comes out. Fix the cable housings with adhesive tape in this area. Route the outer brake cable housing in a large bend to the front wheel brake **(e)**.

Press the brake calliper together and hold the cable housing tight nearby the counterbearing on the brake arm to determine the actual length. Make sure the cable housing is not bent. Mark where you want to cut the cable housing.

Before routing the Bowden cables of the rear wheel brake, turn the handlebars to the full left or right position to determine the longest length required **(f)**. With the handlebars turned it must still be possible to move the cable up or downwards along the head tube without bending or getting stuck at the headset. Turn the handlebars from its farthest left to its farthest right position. The handlebars must remain freely movable, the outer housings must remain slack and not be in the way of another cable.

Pull out all inner cables so far that you can be sure that they are out of the area where you use the cutting tool.

Cut the outer housings to the desired length by using a special cable cutter, e.g. from Shimano or Park Tool, or a highly sharp side cutter **(g)**. Make sure the cables are cut at right angle, thus ensuring a firm contact at the cable stops.

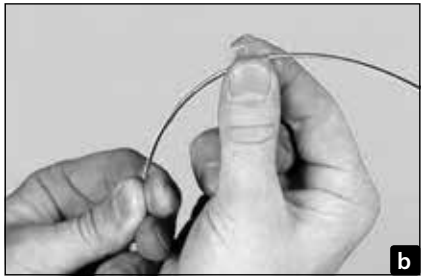
If they are not, grind the housing end vertically to the pull direction **(h)**. Using a grinding wheel would ease this grinding, requires however a good feel for it, as the friction reducing plastic housing is at risk of melting as a result of the created heat inside. If necessary, cool it down with water.

Blunt tools crush the cables unnecessarily and require a lot of reworking. If necessary, reshape the round outer housing, if they were crushed.

Open the little thin plastic tube with a needle, a pointed spoke or a very small Phillips head screwdriver **(a)**.

The outer housings are mounted to the brake lever/shifter units and to the AX-Lightness and engage brake callipers with cable stops.

As a preventive measure for creaking noises and corrosion, apply a little grease to the cable stops and the counterbearing on the brake calliper.



Grease the inner cables by pulling them through some bearing grease between thumb and index finger **(b)**, while inserting the cables through the housings and the cable stops to the brakes.

Slide the outer housings completely into the mounts on the brake lever/shifter units and into the cable stops at the brake. Fix the housings in two to three areas with two to three tightly wound layers of insulation or fabric tape to the handlebars, before winding on the bar tape **(c)**.

Insert the inner cable through the adjustment bolt and slide the outer housing completely into the adjustment bolt.

Release the bolt of the yoke-type brake cable clamp and remove the slotted cable clamping part. Move the yoke over the brake cable and slide the clamping part on the cable **(d)**. Slide the clamping part completely into the yoke with the slot being positioned crosswise to the yoke **(e)**. Press the AX-Lightness and engage brake a little together. Hang the yoke back into the brake arm mount and tighten the cable.

Tighten the Allen screw with a 3 mm key until the Bowden cable is a little tight.

Hold the brake cable fixing tight with an 8 mm open-ended wrench and tighten the Allen screw with a torque wrench to 3 Nm **(f)**.

Adjust the AX-Lightness and engage brake, as described in the chapter **"Synchronising and readjusting the brakes"**. Check once again the cable fit at all stops.

Forcefully pull the brake lever to the handlebars **(g)** several times. This stretches the cables and crushes the outer housings a little. Readjust as the lever travel increases.

Shorten the inner cable by using the cable cutter by about one to two centimetres after fixing the brake cables.

Protect the sharp-edged inner cable against fraying with a cable end sleeve **(h)**.

Bowden cables and brake cables differ a lot and must therefore not be mixed up. The inner cables of Bowden cables are slimmer and have a clearly smaller head. The outer housings of Bowden cables have wire-reinforcements in pull direction, which prevent the housings from being crushed. The outer housings of brake cables, in contrast, have a spiral-shaped steel reinforcement which makes them a little more flexible than their Bowden cable counterparts.

With some brake lever/shifter units you can decide on your own, whether both cables run in the handlebars' front or whether the one runs in the handlebars' front and the other one in the rear. Your decision primarily depends on the handlebars used.

Make sure the stem is in the highest position, otherwise you will no longer have the possibility to change the handlebar position without mounting new cables.

RIMS – WHEELS


a


b

General notes on mounting and compatibility

The wheel consists of the hub, the spokes and the rim **(a)**. The tyre is mounted onto the rim, either a tubular tyre that must be glued on the rim or a clincher or folding tyre which has an inner tube inside. There is a rim tape running around the rim well to protect the sensitive tube against the spoke nipples and the edges of the rim well, which are often sharp.

A quick-release **(b)** or a thru axle connects the AX-Lightness and engage wheels with the frame and the fork.

The AX-Lightness and engage wheels are subjected to considerable stress through the weight of the rider and any carried baggage as well as through bumpy road surfaces and terrain. The permissible total weight for all AX-Lightness and engage wheels is 110 kg. Although AX-Lightness and engage wheels are manufactured with great care and delivered accurately trued, spokes and nipples can lose a little tension on the first kilometres/miles. Ask your AX-Lightness and engage dealer to check and true up the wheels after you have bedded them in over about 100 to 300 kilometres (60 to 180 miles) or 5 to 15 hours of use.

After the bedding-in period, check the AX-Lightness and engage wheels regularly. It will, however, rarely be necessary to tighten the spokes.

Be sure to check the dimensional accuracy of tyres and rims. If in doubt, bring your components to your AX-Lightness and engage dealer. He can decide, whether this is a problem which can be solved or whether the component must be replaced.

Truing (retruing) wheels is a difficult job which you should definitely leave to a specialist.

To avoid any damage it is recommended that you store AX-Lightness and engage wheels in a wheel bag when transporting your bicycle with the wheels removed or when you do not use them for a longer period of time.

Observe the permissible total weight of 110 kg so as not to overload the wheels.

Before replacing the tyres, make sure the new tyres have the same size as the ones mounted before. Bigger sized tyres may collide with parts of the frame or the fork and lead to a wheel blocking.

Please note that aero wheels may be affected by side winds and drift.

Quick-releases and thru axles

Quick-releases

Most road racing and mountain bikes are fitted with quick-releases **(c)** to ensure fast adjustments, assembly and disassembly. Be sure to check whether all quick-releases are tight before you set off on your bicycle. Quick-releases should be handled with greatest care, as they directly affect your safety. Practise the proper use of quick-releases to avoid any accidents.

Quick-release retention mechanisms basically consist of two operative parts **(d)**:

1. The hand lever on one side of the hub which creates a clamping force via a cam when you close it.

2. The tightening nut on the other side of the hub with which the preload on the threaded rod (quick-release axle) is set.

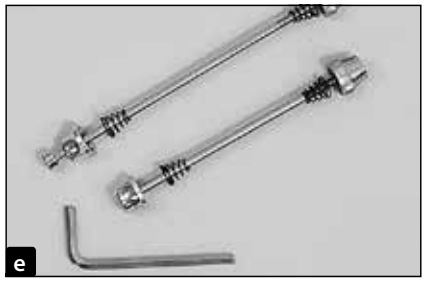
Make sure the levers of both wheel quick-releases are always on the side opposite to the chain. This will help you to avoid mounting the front wheel accidentally the wrong way round. If you are in doubt or if you have any questions, contact your AX-Lightness and engage dealer or our service centre.

Never ride a bike without first having checked whether the wheels are securely fastened. **Risk of accident**!

If your AX-Lightness and engage bicycle is equipped with quick-releases, be sure to lock it to an immovable object together with the wheels when you leave it outside.


c


d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To be on the safe side you can replace the quick-releases by special locks. They can only be opened and closed with a special, coded key or an Allen key **(e)**. If you are in doubt or if you have any questions, contact your AX-Lightness and engage dealer.

How to securely mount the wheel

Open the quick-release **(a)**. The marking "Open" on the lever should become visible now.

Make sure the component to be fastened is in the accurate position.

Move the lever back, as if to close it. Now you should be able to read Ax and "Close" on the outside of the lever **(b)**. When you start closing the lever you should feel virtually no resistance with your hand until the lever is at a right angle to the frame/fork.

When continuing to close the lever the resistance you feel should increase significantly and towards the end even more strength is required to close the lever. Use the ball of your thumb to push it in all the way while your fingers pull on an immovable part, such as the fork **(c)** or the rear stay, but not on a spoke.

In its end position, the lever should be at a right angle to the quick-release axle, i.e. it should not stick out. The lever should lie close to the frame or the fork so that it cannot be opened accidentally. Make sure, however, that the lever is easy to handle for actual quick use.

To check whether the lever is securely locked apply pressure to the end of the hand lever and try to turn it while it is closed. If you can turn the lever around, open it and increase the preload. Screw the tightening nut on the opposite side clockwise by half a turn **(d)**. Close the lever and check it again for tightness.

Finally lift the bicycle a few centimetres so that the wheel no longer touches the ground and hit the tyre from above. If it is properly fastened, the wheel will remain firmly fixed in the drop-outs of the frame or fork without producing any rattling.

With an insufficiently closed quick-release the wheel can come loose, thus creating a serious risk of accident!

Thru axles

Thru axles **(e)** are mounted when bicycles have to withstand high stress occurring, e.g. in the case of mountain bikes. They provide suspension forks with a suitable stiffness.

Before mounting or replacing a fork/wheel combination with thru axle system, be sure to read the present user manual as well as the operating instructions of the respective suspension fork or wheel manufacturer first. If you are in doubt or if you have any questions, contact your AX-Lightness and engage dealer.

There is a wide range of thru axle systems available now. Some systems are tightened with quick-releases. Other systems may require special tools for assembly or disassembly **(f+g)**.

With the conventional thru axle system slide the thru axle through the fork and the hub in a way that the head of the Allen bolt comes to a rest on the right side (the chain side of the bicycle). Once the axle is mounted, gently let the fork deflect a few times **(h)**, thus excluding the chance of the axle getting jammed. Screw the nut onto the axle and tighten it according to the enclosed instructions of the suspension fork manufacturer. To lock the axle, finish by tightening the Allen bolts at the front of the fork, according to the enclosed instructions of the suspension fork manufacturer.

If you are in doubt or if you have any questions, contact your AX-Lightness and engage dealer.


a


b

For dismounting the front wheel you may need tools according to suspension fork manufacturer and thru axle system. To dismount the wheel, loosen the axle support at the fork and remove the axle completely from the hub. To remount the front wheel proceed in the reverse order. Make sure all bolts/quick-release systems are tightened properly. Check the reliable fit of the bolts after one to two hours in use and then every 20 hours in use.

Improperly mounted AX-Lightness and engage wheels may throw you off your bicycle or result in serious accidents!

To mount the axle only use the tools recommended by the manufacturer. Make it a rule to use a torque wrench **(a)**. Tighten carefully by approaching the prescribed maximum torque in small steps (0.5 Nm increments) and check in between the proper fit of the component. Never exceed the maximum torque values indicated by the manufacturer! A too tight fixing of the axle can damage the axle or the fork leg.

If your bicycle is equipped with a **Maxle thru axle system (b)** with quick-release lever, place the wheel into the fork and mount the rotor in the brake calliper. Bring the wheel into the correct position between the drop-outs and slide the axle with the open Maxle quick-release lever from the right side through the drop-out and the hub. As soon as the axle thread engages with the thread of the left drop-out, tighten it by turning the whole Maxle clockwise. Close the Maxle quick-release lever like a usual quick-release lever (see chapter **"How to securely mount the wheel"**).

The **QR15** or **E-Thru system (c)** has been developed jointly by Shimano and Fox and has a 15 mm thru axle that optimises weight. It is mounted like the Maxle system and also operated with a quick-release lever. The special feature of the QR15/E-Thru compared to usual quick-release systems is the firm, bolted connection of the tightening nut to the fork leg on the opposite side of the quick-release lever.

For dismounting the front wheel you may need tools according to suspension fork manufacturer and thru axle system **(d)**. To dismount the wheel, loosen the axle support at the fork and remove the axle completely from the hub.

To remount the front wheel proceed in the reverse order. Make sure all bolts/quick-release systems are tightened properly.

Check the reliable fit of the bolts after one to two hours in use and then every 20 hours in use.


c


d

Improperly mounted AX-Lightness and engage wheels may throw you off your bicycle or result in serious accidents!

To mount the axle only use the tools recommended by the manufacturer. Make it a rule to use a torque wrench. Tighten carefully by approaching the prescribed maximum torque in small steps (0.5 Nm increments) and check in between the proper fit of the component. Never exceed the maximum torque values indicated by the manufacturer! A too tight fixing of the axle can damage the axle or the fork leg.


a


b


c


d

Notes on how to mount rear wheels

Besides the front thru axle systems, there are also **rear thru axle systems (a)**. This system combines extreme stiffness with light weight.

To remove the rear wheel release the axle (with an Allen key or the RWS lever, depending on the system) and pull it out, before removing the rear wheel in the usual way.

Make sure not to insert the axle **(b)** into the hub before mounting the rear wheel.

Perform the rear wheel mounting in the usual manner. Thanks to the axle guides **(c)** the rear wheel is automatically in its correct position and requires no further adjustment. Once you have mounted the rear wheel, insert and tighten the axle **(d)**.

The manufacturers of thru axles deliver their products with detailed instructions. Read them carefully before removing the wheel or doing any maintenance work.

Tyres, inner tubes, rim tape, inflation pressure

The tyres should provide grip and traction. At the same time they should run smoothly and enhance the rider's comfort by absorbing small shocks. Both the rolling friction and the grip depend on the nature of the tyre carcass, the rubber compound and the tyre tread. Your AX-Lightness and engage dealer will be pleased to help you choose from the numerous types of tyres.

If you want to mount a new tyre, you need to observe the sizing system and the actual size of the old tyre.

The latter is specified in two different units on the side of the tyre. One of the sizes is the standardised size in millimetres which is more precise; for road racing bicycles **(e)**: the number sequence 23-622 means that the tyre is 23 mm wide when fully inflated and has an inner tyre diameter of 622 millimetres. The other size is indicated in inches (e.g. 23x7/8 or 700x23c).

For mountain bikes **(f)**: the number sequence 57-559 means that the tyre is 57 mm wide when fully inflated and has an inner tyre diameter of 622 millimetres. The other size is indicated in inches (e.g. 26x2.25").

Tyres must be inflated to the proper inflation pressure **(g)** to provide an optimal compromise between smooth running and riding comfort. Properly inflated tyres are also more resistant to punctures. An insufficiently inflated tyre can easily get pinched ("snakebite"), when it goes over a sharp kerb.

The air pressure recommended by the manufacturer is given on the tyre side **(h)** or on the type label. The lower of the two pressure specifications makes for better cushioning for lightweight riders and is therefore best for cycling on a rough surface. Rolling resistance on level ground decreases with growing pressure, but so does comfort. Highly inflated tyres are therefore most suitable for heavy riders and for riding on tarred roads.

e

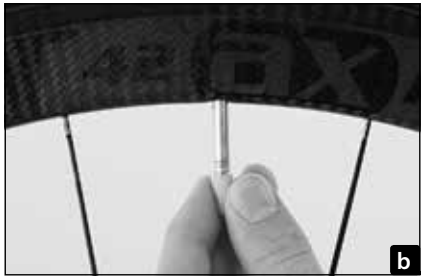
f


g


h

psi	bar	psi	bar	psi	bar
30	2.1	70	4.8	110	7.6
40	2.8	80	5.5	120	8.3
50	3.5	90	6.2	130	9.0
60	4.2	100	6.9	140	9.7

a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Riding with too low pressure can lead to bottom out resulting in a crack or breakage of the carbon rim.

Inflation pressure is often given in the old system of units, i.e. in psi (pounds per square inch). The table **(a)** gives the most common pressure values in terms of both systems.

Clincher and folding tyres and rim alone are not able to hold the air. Therefore, an inner tube has to be placed inside the tyre to retain the air pressure.

Exceptions to this are the tubeless tyres and tubular tyres. In the case of tubular tyres that must be glued on the rim the tube is already integrated into the tyre and can be neither removed, nor patched in the case of a puncture. This type of tyre requires special rims without rim flanges. For more information read the respective instructions, before starting any work with such kind of tyres.

Valves

There is only one valve type in general use on AX-Lightness and engage wheels: The Sclaverand or Presta valve that is designed to withstand extremely high pressures.

It has a plastic cap protecting the valve from dirt **(b)**.

You first have to undo the small knurled nut a little **(c)** and depress it carefully until air starts to escape **(d)**. Check the nut is tightened and seated in its stem, otherwise air may slowly leak out. It can be hard to inflate tyres to the necessary pressure by using hand pumps. It is much easier with a foot-operated or a track pump equipped with a pressure gauge **(e)**.

Replace tyres with a worn tread or with brittle or frayed sides. Dampness and dirt penetrating the tyre can cause damage to its inner structure. The tube might burst. Risk of accident!

Clincher, folding and tubeless tyres allowing an inflation pressure of 5 bars or more have to be mounted on hook bead rims, identifiable by the designation "C". If you are in doubt or if you have any questions, contact your AX-Lightness and engage dealer.

Mounting a new tyre of another size (f) might possibly cause the tip of your shoe to touch the front wheel while steering. Risk of accident!

Treat your tyres with care. Never inflate your tyres beyond the maximum permissible pressure, otherwise they might burst or come off the rim during the ride. Risk of accident!

If you mount wheels with carbon rims (g) on your road racing bike, it may be possible that you have to change the brake pads, as conventional brake pads often do not provide the desired braking effect. For more information read chapter "The brake system" of the present user manual. If you are in doubt or if you have any questions, contact your AX-Lightness and engage dealer.

Always ride your bicycle with the prescribed tyre pressure and check the pressure at regular intervals (h), at least once a week.

Observe the maximum pressure value of the rim. The pressure is dependent on the tyre width. If you are in doubt or if you have any questions, contact your AX-Lightness and engage dealer.


e

f


g

h

Rim trueness and spoke tension

For the true running of the wheel it is imperative that the tension exerted by the spokes is distributed evenly around the rim **(a+b)**. If the tension of a single spoke changes, e.g. as a result of riding fast over a kerb or of a loose nipple, the tensile forces acting on the rim become unbalanced and the wheel will no longer run true. The functioning of your bicycle may even be impaired before you notice the wobbling appearance of a wheel that has gone out of true.

With rim brakes the sides of the rims also serve as braking surfaces **(c)**. An untrue wheel can impair your braking power. It is therefore advisable to check the wheels for trueness from time to time.

For this purpose lift the wheel off the ground and spin it with your hand. Watch the gap between the rim and the brake pads. If the gap varies by more than a millimetre, you should ask an AX-Lightness and engage dealer to true up the wheel **(d)**.

Do not ride with untrue AX-Lightness and engage wheels. In the case of extreme side-to-side wobbles, the brake pads of rim brakes can miss the rim and get caught in the spokes! This normally instantly jams the wheel and throws you off your bicycle.

Loose spokes must be tightened at once. Otherwise the load on the other spokes and the rim will increase.

Wheel removal

If your bicycle has **side-pull brakes** unhook the brake cable holder (AX-Lightness), open the quick-release lever at the brake (Shimano, SRAM) **(e)** or shift the pin in the brake lever/shifter unit on the handlebars (Campagnolo) **(f)**.

If your bicycle has **cantilever** and **V-brakes** you first have to unhook the brake cable from the brake arm. To do this, grip the rim with one hand and press the brake pads and/or arms together.

In this position the usually barrel shaped nipple of the lateral brake cable or the brake hose (of V-brakes) can easily be disengaged.

If you have **disc brakes**, you should first check the exact position and condition of the brake pads and/or wear indicators (ear or nose-shaped metal protrusions) **(g)**. In this way you will be able to tell after the removal whether the brake pads are still in their correct position.

If you have derailleur gears, you should shift the chain to the smallest sprocket before removing the rear wheel. This shifts the rear derailleur right to the outside where it does not interfere with the removal of the wheel. Open the quick-release of the wheel, as described in chapter **"Quick-releases"**.

If you cannot remove the wheel after releasing the lever, this is due to the drop-out safety tabs. They come as metal catches which engage with recesses in the drop outs. Just release the quick-release adjusting nut a little and slip the wheel past the tabs.

You will find it easier to remove the rear wheel, when you pull the rear derailleur slightly backwards. Lift the bicycle off the ground and give the wheel a gentle tap with your hand so that it drops out.

Rotors can become hot, so let them cool down before removing a wheel.

Do not pull the (disc) brake lever with a removed wheel and make sure to mount the safety locks when removing the wheel.

Observe the chapter **"The brake system"** of the present user manual and the gear manufacturer's operating instructions.


a


b


c


d

Wheel mounting (mountain bike/road racing bicycle)

Make sure the wheel is correctly seated in the drop-outs and accurately centred between the fork legs or the seat and chain stays. Make sure the quick-release **(a)** and the drop-out safety tabs are correctly seated. For more information see chapter **"Quick-releases".**

Hook up the brake cable holder (AX-Lightness) at once, close the quick-release lever at the brake (Shimano, SRAM) or shift the pin in the brake lever/ shifter unit on the handlebars (Campagnolo) **(b)**. Check whether the brake pads hit the brake surfaces of the rims.

If you have **disc brakes**, check before mounting the wheel whether the brake pads rest snugly in their seats in the brake calliper body. The gaps between the brake pads and the wheel should be parallel and the wear indicators in their correct position. Make sure you guide the rotor carefully between the brake pads.

If you have **cantilever** or **V-brakes** hook up the brake cable at the brake arm **(c)**. To do this, grip the rim with one hand and press the brake pads and/or the brake arms together. In this position the usually barrel shaped nipple can easily be engaged.

After mounting the wheel and tightening the quick-release pull the brake lever **(d)** (several times, if you have disc brakes).

To do so lift the bicycle off the ground and spin the wheel with your hand. With the wheel spinning the rotor should not drag along the brake calliper or the brake pads and the rim should keep off the (rim) brake pads.

If you have rim brakes, make sure you hook up the brake cable immediately after the wheel mounting!

Before setting off again check that the braking surfaces and/or rotors are still free of grease or other lubricants after the wheel mounting **(e+f).**

Check whether the brake pads hit the braking surfaces of the rims. Make sure the wheel is properly seated and firmly fixed in the drop-outs. Always do a brake test as described in chapter **"Before your first ride – Intended use"**!

After mounting the wheel test the brakes while standing **(g)**. The brake lever should have a defined pressure point. You should not be able to pull it all the way to the handlebars. If you can, check the bicycle and the brake system according to the general bicycle manual of your bicycle manufacturer.

Before riding on your bicycle check that after the mounting the braking surfaces, the rotors and the brake pads are still free of grease or other lubricants.

No matter what type of brake you install (V-brake, disc brake or else), be sure to read the chapter **"The brake system"** in the present user manual or the manual of the brake manufacturer beforehand. Follow the installation instructions and pay special attention to the tightening torques.

e


f


g

a


b


c


d

Tubular tyres

To ensure a durable fit, a tubular tyre needs to be mounted carefully. The mounting needs to be carried out in several steps and may require a little time. A little practice and experience with the glue you are using and the respective tubular model can speed up the job.

There are two possibilities of gluing a tubular tyre to the rim **(a)**, i.e. with adhesive tape or with liquid tyre glue. Using adhesive tape will speed up the mounting, the tyre, however, will not fit as reliable as with liquid glue. In the event of a puncture the tape will often cling to the dismounted tyre and your spare tyre may not bond to the rim sufficiently well.

Multiple thin layers of liquid tyre cement (tyre glue) will ensure a better fit of the tyre. The coat of glue will stick to the rim even after tyre removal and fix the spare tyre still sufficiently for the careful ride home. Afterwards, however, the spare tyre needs to be removed and fixed once again with a new layer of tyre glue. Tyre glue does also sticks to fingers and clothes. For this reason put on old working clothes when mounting tyres.

AX-Lightness and engage recommend that you use Conti carbon glue or Tufo gluing tapes. We cannot recommend using any other products.

A poorly glued tyre can come off the rim. Risk of accident!

Have a tubular tyre mounted by an AX-Lightness and engage dealer for your own safety.

There is special tubular tyre cement (e.g. from Continental) for carbon rims **(a)**. Before using this type of glue, read the operating instructions.

Observe the video showing the secure gluing of Continental tubular tyres on carbon rims at www.conti-online.com

Tyre removal

To remove the tyre, start opposite the valve by pushing the tyre to the centre of the rim until there is a gap and the tyre starts to come off **(b)**. If it does not, slide a plastic tyre lever into the gap to lift off the tyre. Move the tyre lever around until the tyre comes off the rim **(c)**. Subsequently you can pull the tyre off the rim **(d)**.

Tyre mounting with common tubular tyre glue

Remove the protective valve cap and screw a valve extension, if necessary, to the valve head unscrewed before, if you intend to mount the tyre on a deep rim **(e)**.

Inflate the tyre to a point where it starts to become round and then stick the valve through the valve hole. Starting from the valve and working in both directions, press the tyre into the tyre bed all the way round, as described further below **(f)**. If you are unable to mount the tubular tyre completely on the rim or only with excessive forces, it is possible that it cannot be mounted properly. Do not stretch the tyre, by putting your foot in it and pulling it forcefully upwards with both hands. Ask somebody to help you instead.

After mounting the tubular tyre (not yet glued!), spin the wheel and see whether the tyre runs true **(g)**. The area where the valve comes out of the tyre is often thickened which leads to a runout of the rim and makes the wheel jolt during the ride.

Check the proper seat of the tyre and correct it. If necessary, ask your AX-Lightness and engage dealer for advice. Replace the tyre, if necessary.

The fully inflated tyre on the rim should be stored away in a dry place for a few days, at least however for 24 hours. This will ease the mounting.

Wind adhesive tape around the valve to avoid any rattling during the ride **(h)**.


e


f


g


h


a

b


c


d

Clean the rim base from any grease or oil using a benzine, spirit or acetone-soaked rag **(a)**. Wait until the solvent has evaporated completely before you start applying the tyre glue. The easiest way to apply the glue is by clamping the wheel in a truing stand or by mounting it on an old fork clamped in a vice.

With liquid tyre glue you need several layers to create a well-adhesive base. Spread the tyre glue evenly and in very thin layers over the entire rim.

With a little practice you will be able to apply the glue straight from the tube. But you can also use a stiff brush **(b)**. When using tyre glue in tins, you need a brush in any case. Allow the tyre glue to dry until a finger test will proof that it is tacky-dry. This can take several hours. Apply another two thin layers of glue in the same way and let them dry. Also apply a some glue to the base tape. Rim and tyre should be stored separately at least over night.

Before mounting the tyre also apply a coat of glue to the base tape of the tubular tyre **(c)**. To complete the adhesive bed add a last layer of glue.

Let the topmost layer flash off for a short moment, but not dry, and place the AX-Lightness and engage wheel on the ground with the valve hole facing upwards. Inflate the tyre until it starts to round and then stick the valve through the valve hole and press it firmly against the rim **(d)**.

Make sure the sides of the tyre do not touch the adhesive bed, since your tyre will otherwise look smudgy right away. If you have taken care to leave the section opposite the valve hole free of glue, you need not be concerned about glue smearing on the ground or dirt getting into the glue when you place the wheel on the ground.

Take hold of the tyre right and left of the valve with both hands, pull it vigorously downward and work it bit by bit into the rim base **(e)** until you have about 20 centimetres left to go.

Starting from the top on either side of the valve pull the tyre down once again, letting them gradually slip down to the not yet mounted section **(f)**. Keeping the tyre taut by holding your fingers against the rim and your thumbs on the tyre, brace the wheel against your hips. Press the tyre with both thumbs into the rim base **(g)**.

Once the tyre is seated in the base, it needs to be centred, since it will rarely run true right away. To do so clamp the AX-Lightness and engage wheel in the mounting stand again and spin it. If the tread does not run accurately in the centre or if there is any lateral swerving of the tubular, lift it in that area, twist it a little and let it down again.

When the tyre runs smoothly in the centre, take the wheel off the mounting stand and inflate the tyre to approximately half its nominal pressure. Lean with your hands on the ends of the axle and quick-release skewers and roll the wheel on the ground **(h)**. As you roll the wheel, vary between pressing it vertically downward and at a slant to either side.

When the tyre runs true during the final check, inflate it to the maximum pressure. Reduce the pressure subsequently to about 6 bar (road racing bicycle) and to 2.5 bar (mountain bike). Wait at least eight hours, or better yet, a whole day, before taking it for a first ride. Match the tyre pressure with your wishes before your first ride.

Benzine and tyre glue should only be used in a well-aired place, since both materials are highly flammable. Keep them in a safe place out of children's reach.


e


f


g


h

When mounting a tyre on a rim that has already been used, it may be necessary to remove glue residues and dirt with a steel brush or with emery cloth **(a)**. When you are done, wipe the rim with a soft rag and acetone or benzine.

There is special tubular tyre cement (e.g. from Continental) for carbon rims. Before using this type of glue, read the operating instructions.

Observe the video showing the secure gluing of Continental tubular tyres on carbon rims at www.conti-online.com

Clincher and folding tyres

Tyre removal

Remove the cap and the fastening nut off the valve and deflate the tyre completely. Press one tyre side from the rim sides towards the centre of the rim. This will ease the removal.

Apply a plastic tyre lever to one bead of the tyre about 5 cm beside the valve **(b)** and lever the tyre out of the rim in this area. Hold the tyre lever tight in its position. Slip the second tyre lever between rim and tyre at a distance of about ten centimetres on the other side of the valve and lever the next portion of the bead over the edge of the rim **(c)**.

After levering a part of the tyre bead over the edge of the rim you should normally be able to slip off the whole tyre on one side by moving the tyre lever around the whole circumference. Now you can remove the inner tube **(d)**. Make sure the valve does not get caught in the rim, as this can damage the inner tube. If necessary you can remove the whole tyre by pulling the other tyre bead off the rim. Repair the puncture according to the instructions of the repair kit manufacturer or replace the inner tube by a new one.

When you have removed the tyre, you should also check the rim tape **(e)**. It should lie squarely in the rim trough, covering all spoke nipples, and should neither be damaged nor brittle. In the case of double wall rims the tape must cover the entire rim base, but it should not be so broad as to stand up along the inside edges of the rim trough. Rim tapes for this type of rim should only be made of fabric or durable plastic. If you are in doubt or if you have any questions, contact your AX-Lightness and engage dealer.

If the fabric of the tyre is destroyed by the perforating object, replace the tyre to be on the safe side.

Replace spoilt rim tapes immediately.

If you get a puncture en route, inflate the inner tube and bring it close to your ear. In most cases you can hear the air coming out. At home you can help yourself with a bucket of water where you can locate the hole by the bubbles. When you have found the hole, look for the corresponding place on the tyre and check it. Remove the foreign body, otherwise another puncture can occur.

Tyre mounting

When mounting a tyre make sure no foreign matter, such as dirt or sand, gets inside the tyre and you do not damage the inner tube in the process.

Slip one bead of the tyre onto the rim. Using your thumbs, press one bead over the edge of the rim and then around the entire circumference. This should normally be possible without using tools.

Stick the valve of the inner tube through the hole in the rim **(f)**.

If you have wheels with deep rims, you need to screw on a valve extension **(g+h)**.

Inflate the inner tube slightly **(a)** so that it becomes round and push it into the tyre all the way round. Make sure not to leave any folds in the inner tube.

To finish mounting the tyre, start at the opposite side of the valve. Use your thumbs to press the other tyre bead over the rim flange as far as you can.

Make sure the inner tube does not get pinched and squashed between the tyre and the rim. You can prevent this by pushing the inner tube into the hollow of the tyre **(b)** with a finger as you work along.

Work the tyre into the rim by approaching the valve symmetrically from both sides. Towards the end, you will have to pull the tyre vigorously downwards **(c)** to make the already mounted portion of the tyre slip towards the deepest part of the rim well. This will ease the job noticeably on the last centimetres.

Before fitting the tyre completely on the rim check again whether the inner tube lies properly inside the tyre and press the last stretch of tyre over the edge of the rim using the balls of your thumbs.

If this does not work, you will have to use the tyre levers **(d)**. Make sure the bent ends point towards the inner tube and the inner tube does not get damaged.

Push the valve a little into the tyre so that the inner tube does not get caught between the rim and the tyre beads. Check whether the valve stands upright. If not, dismount one bead again and reposition the inner tube.

To make sure the inner tube does not get pinched between the rim and the bead, move it sideways back and forth between the sides of the rim. While doing so, also check whether the rim tape has shifted.

Inflate the inner tube to the desired pressure. The maximum pressure is indicated on the side of the tyre **(e)**.

Check whether the tyre is properly seated by inspecting the fine witness line just above the rim edge. This line should be even to the rim all around the tyre **(f)**.

Starting from the maximum tyre pressure you can now reduce the pressure through the valve to suit your needs. Please observe the recommended tyre pressure range.

Truing up wheels

Although AX-Lightness and engage wheels are delivered accurately trued, it is a matter of fact that the spokes will "bed in" to the hub and rim on the first kilometres. As a result thereof the spokes lose a little tension. Furthermore, a loosening of the spokes on their own, can lead to a lateral or vertical runout of the wheel. For this reason make sure the wheel set is checked and true up, if necessary, after you have run it in, at the latest however after about 100 kilometres to 300 kilometres (60 to 180 miles).

Truing up wheels is a job best left to your AX-Lightness and engage dealer. Inappropriately tightened spokes can cause irreparable damage.

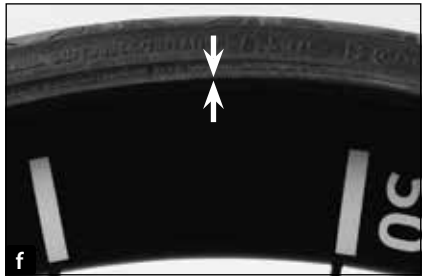
If you feel up to doing it after all, be sure to observe the following instructions during truing up:

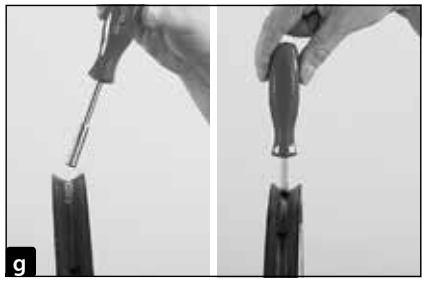
» The spoke nipples of AX-Lightness and engage wheels are sunk in the rim. That means these can only be retightened from outside, i.e. from the side of the tyre. The tyre must therefore be removed. In addition, you need special tools **(g)**.

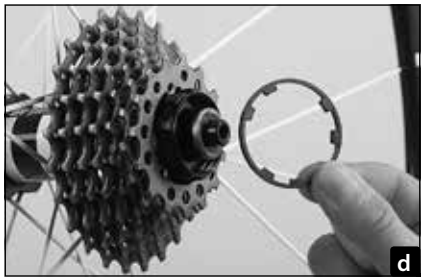
  Keep in mind that tubular tyres need to be reglued subsequently.

» The spokes of AX-Lightness and engage wheels are highly weight-optimised. Make sure not to distort the spokes when tightening the spoke nipples. Keep the spokes in position by using special tools **(h)**.

  Overtighten the nipple by a quarter of a turn and turn it back afterwards; the spokes will then remain free from harmful tensions.







» Do not release the nipples to true up a lateral or vertical runout. Always re-tension the spokes to regain the tension they have lost during riding.

» The nipples of AX-Lightness and engage wheels that were in use for a rather long period of time may "cling" to the spokes. It is advisable to start with slightly releasing the nipples, i.e. by a quarter turn, before you tighten them, to prevent the spokes from being turned off during re-truing.

We from AX-Lightness and engage recommend that you have your wheels trued up solely by an AX-Lightness and engage dealer. Inappropriately tightened spokes can cause irreparable damage.

Mounting the sprocket assembly

AX-Lightness and engage wheels are only available with a free-wheel for Shimano and SRAM and with a second one for Campagnolo sprocket sets.

If you have a Shimano and SRAM 10-speed assembly, make sure to insert the thin intermediate ring on the inside of the free-wheel before mounting the assembly **(a)** since you will otherwise not be able to fasten it securely. You don't need the ring, however, if you have a 11-speed assembly.

AX-Lightness and engage freewheel bodies are made of aluminium. Be sure not to fit these lightweight aluminium freewheel bodies with single sprockets or with sprocket sets that are screwed together from single sprockets with intermediate rings. Single sprockets will eat their way into the softer material of the freewheel body which makes a later dismounting difficult. The freewheel body could be damaged or notched on this occasion! Freewheel bodies with such kind of damage are neither covered by the warranty, nor by the guarantee.

Be sure to only use Shimano, SRAM and Campagnolo sprocket sets with sprocket carriers. These sprocket sets have the larger sprockets mounted on aluminium or plastic carriers. They provide a bigger contact area, the stress being thus spread more efficient.

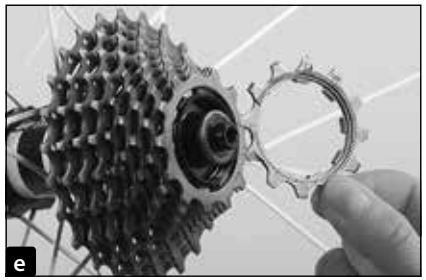
Spray the sprockets and the whole sprocket set with wax **(b)** before mounting it and let it dry well. That prevents corrosion and makes for an easier dismounting at a later date.

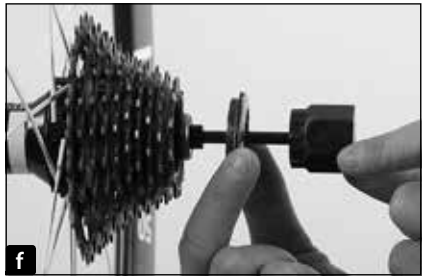
Slide the sprocket carriers **(c)**, intermediate rings **(d)** and the small individual sprockets **(e)** onto the profiled freewheel body. The profile is asymmetric to ensure that the ramps of adjacent sprockets are optimally positioned in relation to one another. Make sure that the tooth number engraved on each sprocket faces inward. If there are no engraved tooth numbers, mount the sprockets so that the ramps face outward.

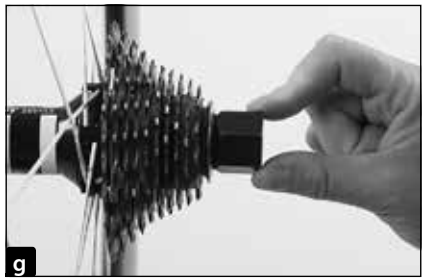
Grease the thread and the contact area of the lock nut and tighten it by hand **(f)** by one to two turns **(g)** before applying a plug tool **(h)**. Tighten the nut with a torque wrench fitted onto the plug tool. Be sure to observe the recommended torque value of 30 – 40 Nm, unless otherwise specified in the enclosed description of the hub manufacturer. Do not exceed the maximum torque value. Too high tightening torques can damage the thread.

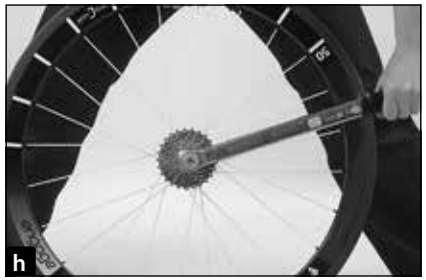
Check the firm seat of the sprocket set by trying to move it crosswise to the direction of motion. Finish by turning the freewheel with the mounted sprockets. Check it for ease of movement and make sure the sprockets run true. If not, you need to dismount the sprocket assembly and find out the cause.

Loose sprocket sets may be caused by unsuitable intermediate rings. Try another intermediate ring or ask your AX-Lightness and engage dealer for advice.





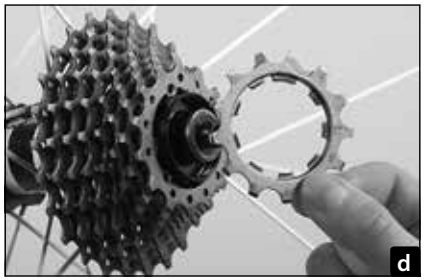





a


b


c


d

After replacing a sprocket assembly or mounting the rear wheel for the first time onto your bike you need to check the functioning of the gears.

Please make sure the limit stops are properly adjusted. An inappropriate adjustment can lead to a failure of the drive or make the rear derailleur collide with the spokes – this can damage your bicycle or even result in an accident!

The lock nut of the sprocket assembly must engage four full turns at least, otherwise there is the risk that the drive is damaged.

Check the functioning of the gears after the reassembly of the sprocket assembly (a).

Dismounting the sprocket assembly

Start with mounting a plug tool **(b)** that matches exactly the profile of the sprocket assembly lock nut. Secure the tool, if necessary, with the quick-release. However, instead of closing the quick-release as usual, be sure to only tighten it a little to ensure that the plug tool is secure on the lock nut.

This is to prevent the tool from tilting or slipping off abruptly. Hold the sprocket assembly tight with a chain whip. Open the lock nut by using a ring or fork spanner matching the extractor tool **(c)**.

Open the quick-release bit by bit as the lock ring comes loose so that you can screw it off.

Remove the sprocket assembly from the freewheel body. The first sprockets and intermediate rings are mounted individually **(d)**. If they cannot be removed, they may have worked themselves a little into the surface of the sprocket assembly. Free the sprockets by inserting two wide-blade screwdrivers opposite each other into the gaps at the outermost sprocket.

Mounting the brake rotors

AX-Lightness and engage MTB disc wheels are made for 6-hole mountings in accordance with the IS 2000 standard **(e)**.

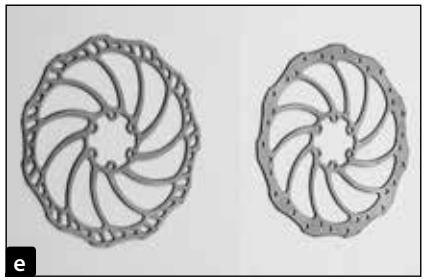
Place the rotor on the hub flange **(f)**. Observe the arrow on the rotor **(g)**. It must be visible from outside and point in the wheel's running direction.

Check whether the rotor engages fully with the hub flange. If it does not, both the rotor and the hub flange need to be measured. Ask in this case your AX-Lightness and engage dealer. Be sure to always use original parts supplied by the brake manufacturer (rotors and bolts).

Insert all six bolts typically treated with liquid bolt retaining compound but without grease and tighten them with a Torx or Allen key until their heads evenly engage with the rotor.

If necessary, apply liquid bolt retaining compound (Loctite) to the bolt threads, if they have not yet been treated with retaining compound by the manufacturer.

Turn the rotor in the opposite direction to the arrow until it engages with the bolts. Tighten the bolts alternately by using a torque wrench to a torque of 3 to 4 Nm **(h)** to begin with. Then tighten the bolts to the torque value recommended by AX-Lightness or engage .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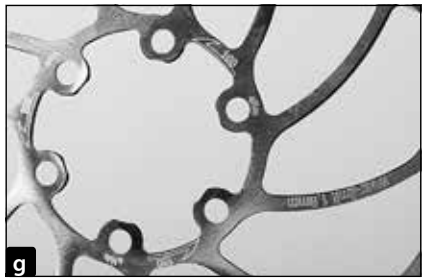
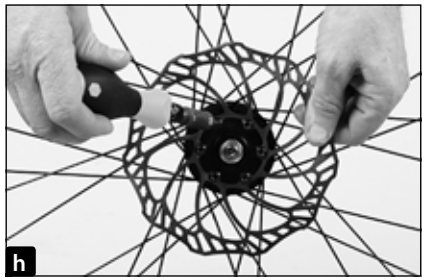

g


h

a


b

If the bolts are to be re-used after dismounting, they need to be treated with another coat of retaining compound!

Also observe the general bicycle user manual of the bicycle manufacturer as well as the chapter **"The brake system"** of the present user manual. If you have any questions, contact your AX-Lightness and engage dealer or our service centre.

Brake pads for rim brakes

We recommend that you use AX-Lightness and engage rims with BBB brake pads, models BS-03AC for Shimano and SRAM brakes and BS-03CC for Campagnolo brakes or Ashima cork carbon brake pads **(a+b)**. With these components you have the best results in terms of braking effect, even under wet conditions and when it comes to wear. If you have any questions, contact your AX-Lightness and engage dealer.

If the brake pads are worn down, have them replaced immediately. The degree of wear can be determined by the wear indicators, such as grooves in the pads, that wear down gradually with braking.

Tips on braking

Best braking performance on level ground and on a non-slip surface are achieved by always actuating both brakes simultaneously, if necessary. During heavy braking the front wheel's braking force is nearly 100%.

Too heavy braking with the front wheel brake **(c)** can result in an overturning of the bicycle **(d).** Test your brakes after a brake pad replacement in an area free of traffic until you have full control of your bike.

Actuate the brakes particularly carefully in a bend and on wet or slippery ground. AX-Lightness and engage recommend that you do not brake in bends, as this may result in a loss of road grip and consequently in a fall. If you are, however, forced to brake when turning, actuate the rear brake.

Please note that the road grip is greatly reduced in wet and dirty conditions. Be particularly cautious when riding on wet or dirty roads and do not ride as fast as you would in dry conditions to have more time for braking.


c


d


a


b


c


d

What to bear in mind with rim brakes

Please note, if you have rim brakes, that the braking effect **(a)** is also greatly reduced in wet conditions. It may take some time until the brake responds. Let the brake drag before the actual braking manoeuvre to get the rim dry.

Be particularly cautious when riding on wet or dirty roads and do not ride as fast as you would in dry conditions to have more time for braking.

Braking on long and steep descents can heat up the tyre or tube and even have a harmful impact on the rim. The glued tyre can come loose or the rider can experience a sudden loss of air. This can make you loose control of your bicycle and lead to a crash.

Do not let the brakes drag when riding downhill. Brake briefly and release the brake once again. Actuate both brakes **(b)** to dissipate the generated heat on both brakes and rims. Stop, if necessary, and let the brakes cool down from time to time.

Do not let the brakes drag when riding downhill. Let both the brake and the rim cool down.

Before using your AX-Lightness and engage wheels in a rain race **(c+d)**, we strongly recommend that you make a test ride in the rain to get used to the different braking performance.

FORK – HEADSET

Forks

What to bear in mind with carbon steerer forks

Carbon steerer tubes **(e)** are in general among the most delicate bicycle components. For this reason any work on AX-Lightness and engage forks requires a lot of expert knowledge and greatest attention. This kind of work is best left to your AX-Lightness and engage dealer.

The stem clamping area must be free of burrs and the AX-Lightness and engage fork steerer must have enough support inside the stem **(f)**. Stems with many recesses in the clamping area or with a cut-out in the clamping area pointing towards the stem are not suitable. The steerer tube clamp must be closed, i.e. it must be free of any recesses.

AX-Lightness and engage carbon steerer tubes are manufactured with fine tolerances. For this reason the stems normally fit snugly on the fork steerer tube. Do not install stems that have play on the fork steerer.

AX-Lightness and engage carbon steerer tubes must remain free of grease, otherwise a reliable and sufficient clamping of the stem is not achieved. In this case you would require high torque values damaging the steerer tube or the stem and resulting in a failure. Degrease the stem and the fork with benzine or spirit, if necessary. Apply AX-Lightness and engage carbon assembly paste subsequently **(g)**!

AX-Lightness recommend that you use Tune gumgum expanders **(h)**.

Other pre-load mechanisms acting as counterbearing for the adjusting bolt inside the fork steerer are often delivered without being greased. In this case increased inner friction can prevent the transformation of bolt force into clamping force. Apply grease specifically on the inner, bevelled surfaces of the slotted sleeve and the inner cone.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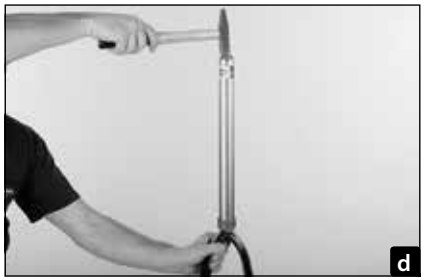

The outer surface of the sleeve must remain free of grease. Apply AX-Lightness carbon assembly paste in this area, as well, before tightening the mechanism in the fork steerer.

AX-Lightness forks in combination with AX-Lightness stems can also be used without expander. Dismount in this case the expander after having adjusted the headset. The maximum torque value of the stem bolts is 4 Nm.

Never use a star nut **(a)** as counterbearing inside the fork steerer! **Risk of breakage**!

If you replace a headset of an already used fork, check the steerer tube and the dismounted headset carefully for scratches, abrasion marks and notches. Notches in the contact area indicate defective processing or deficient design of the headset in these areas.

Mounting forks with threadless carbon steerer

The cutting of the steerer tube, the press fitting of the crown race and the installation of the fork into the frame are jobs for a mechanic. Have this work solely done by an AX-Lightness and engage dealer. An unauthorized installation and maintenance will render the warranty void.

Improper installation increases the risk of breakage for the AX-Lightness and engage fork and stem. **Risk of accident**!

Be sure to strictly observe each of the following instructions. Non-observance of these instructions can result in a failure of the AX-Lightness and engage fork and lead to a fall with serious consequences.

Measure the crown race **(b)** and the fork crown **(c)** first. Forks with 1 1/8"- steerer tubes (steerer tube diameter 28.6 mm) require crown races at a nominal diameter of 30.0 mm.

Make sure the diameter is not 0.1 or 0.2 mm bigger than the inner diameter of the crown race.

Make sure the contact surfaces of the fork crown and the crown race are clean.

Some manufacturers provide their fork crown races with a slit that allows an easy installation on the fork steerer.

If this is not the case, hit the crown race with an appropriate special tool **(d)** until it is in full contact with the fork crown and until any gap between crown race and fork crown has disappeared. Keep the AX-Lightness and engage fork in hand during hitting and do not put it down. **Risk of breakage**!

If there is hardly any resistance when sliding on the crown race **(e)** due to an improper fit, apply some two-component epoxy adhesive to fix it additionally.

Stop as soon as you feel a very high resistance when sliding on the crown race and re-dismount it. Apply some grease on the fork crown **(f)** and try again.

Do not apply grease or oil on the steerer tube in the clamping area of the stem, as this will prevent a reliable clamping!

Assemble all parts of the headset, insert the desired number of spacers under the stem and mark the top edge of the stem, e.g. with a touch-up pencil **(g)**.

If you have not yet found your preferred position of the stem, insert more spacers under the stem to begin with. Observe the maximum stacking height of spacers of 30 mm under the stem **(h)**.


a


b


c


d

Do not clamp the AX-Lightness and engage fork into a vice to cut it, as this could damage the fork steerer. Clamp the fork steerer into a suitable device instead, e.g. into a special bracket **(a)**.

Use a sharp, fine-toothed metal saw (24 teeth) **(b)** and cut the fork steerer at low pressure 2 mm below your marking **(c)**. Make sure to keep the inner steerer tube free of chips and dust.

Do not blow off the saw chips. Remove the chips with a damp rag **(d)** and dispose of them together with the rag!

Use a file with fine teeth to gently remove any burrs from the area of the cut **(e)**. Insert the file from the outside to the inside **(f)** and not vice versa, otherwise the fibres will fray out.

Seal the cut with two-component adhesive (epoxy resin), clear varnish or super glue.

Wipe off excess adhesive from the steerer tube side immediately upon sealing.

Let the adhesive harden before re-installing the AX-Lightness and engage fork. Make sure all spacers and the clamping area of the sleeve are free of burrs.

Use AX-Lightness and engage carbon assembly paste to ensure a reliable fit and low torque values on the steerer tube and the stem itself in the clamping area!

Continue the installation as described in chapters **“Mounting AX-Lightness and engage Aheadset®-stems”** and **“Adjusting the AX-Lightness and engage Aheadset®-headset”.**

If there is no extra long nut delivered with the road racing fork, use the sleeve nut of the brake manufacturer for brake installation. Check that the nut has a minimum grip of 8 turns!

Before installing a brake, be sure to read the chapter “The brake system” or the manual of the brake manufacturer. Follow the installation instructions and pay special attention to the torque values.

Verify that the gaps between bearing cover and head tube as well as between fork crown and lower bearing cup race are evenly parallel. If they are not, the bearings possibly run rough.


e


f


a


b


c


d

Headset

General notes on mounting and compatibility

The headset connects the AX-Lightness and engage fork to the frame, but allows it to move freely **(a)**. It must turn with virtually no resistance, if the bicycle is to run straight, stabilising itself as it travels. Shocks caused by uneven road surfaces expose the headset to considerable levels of stress. In this way it can become loose and go out of correct adjustment. You should check the headset at regular intervals **(b)**, readjust it, if necessary, and have it greased at least once a year.

If you have a full-carbon fork the surface between steerer tube and stem as well as between the preload mechanism (clamping cone) and the inner side of the steerer tube must remain free of grease, otherwise a reliable clamping of these components cannot be granted. If you have an AX-Lightness and engage carbon fork, the grease must, therefore, be applied carefully and specifically between the steel/aluminium parts of the bearing and the clamping.

Recurring bearing play may be due to insufficient friction between stem and fork and/or to a poor fit of the counterbearing in form of a gumgum or a cone mechanism in the fork steerer. Apply a thin layer of AX-Lightness and engage carbon assembly paste on the clamping surfaces **(c+d)** to ensure a proper and gentle clamping.

Furthermore, check whether the AX-Lightness and engage fork steerer ends 2 mm beneath the top edge of the stem, otherwise adjusting the bearing play is impossible.

Steering resistance or play in some handlebar positions can be due to improper fit, i.e. when the bearing races in the frame are not snug as a result of deficient processing or when unsuitable bearings were mounted. In such a case, please contact your AX-Lightness and engage dealer.

Headsets come in different diameters and angles. Often the exact headset description is printed directly on the cartridge bearing. If not, a headset gauge that you can obtain from your AX-Lightness and engage dealer will help you.

Checking the headset

Pull the front wheel brake and place the fingers of your other hand around the gap between frame and bearing cover. Bring your weight to bear on the saddle and push the bicycle a little back and forth **(e)**. If there is movement at the gap, the headset shows too much play. Repeat this test with the front wheel turned crossways.

Letting the front wheel bounce to the ground from a height of approx. 10 cm is another method that requires, however, a certain amount of experience **(f)**. Knocking noises indicate too much bearing play. However, rattling brake levers, cables or cycle computers may be misguiding!

To check whether the headset turns smoothly, take hold of the top tube and lift the front part of the bicycle until the front wheel is about 20 cm above the ground. With a little tap on the grips, the handlebars should turn easily until either the brake touches the frame or the handlebars hit the top tube **(g)**. Perform this test to the right and to the left.

If the handlebars do not turn or only half way, slacken the cables and try again. In case there is any cracking or rubbing noise, check where it comes from. Often these noises are due to cables that are dry or even rusty in their cable stops. In this case, please apply thin lubricant **(h)**. If that still does not help, check whether the AX-Lightness and engage fork turns freely at the bottom of the head tube and whether the bearing cover has enough play. The gaps as well as the seals must be even. To check the headset turn the AX-Lightness and engage fork from far left to far right.


e


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g


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Headset maintenance

The maintenance of the headset, the removal of noises in spite of correct adjustment or an insufficient steering behaviour require a dismounting of the AX-Lightness and engage fork from the frame.

The maintenance of the AX-Lightness and engage headset is a job for a skilled bicycle mechanic. Have this work solely done by an authorized AX-Lightness and engage dealer.

If you want to try it on your own, you should have the know-how and experience of a mechanic as well as special tools, e.g. a high-quality torque wrench, if necessary.

Undo the front brake and remove the front wheel.

Unscrew the top Allen bolt **(a)** completely and remove the top cap **(b)**. Release the bolt(s) on the stem side by two to three turns **(c)**.

Pull off the handlebars including stem, keep hold of the AX-Lightness and engage fork with one hand and let the handlebars/stem hang down. Make sure frame, levers, handlebars and stem remain undamaged.

Remove the spacers **(d)**, the bearing cover and the upper bearing cone. Clean the parts with a rag and arrange them in the order you removed them. Keep the order in mind.

Carefully pull out the AX-Lightness or engage fork and wipe off any dirt from the parts. Check on the dismounted fork, whether the crown race was installed horizontally, whether it is in sound condition (i.e. without notches), and whether the steering tube is free of scratches, notches, colour changes etc. over its entire length and circumference **(e)**.

Remove the bearings and wipe off the grease from the bearing cup races. Check whether the bearings turn freely and without play and make sure they are free from chips etc. If you have an open bearing headset, you should check in addition, whether they are well greased. Make sure there are no chafe marks or notches. Asymmetrical marks of that kind indicate a careless processing.

Apply plenty of grease **(f)** (not AX-Lightness and engage carbon assembly paste) on the bearing and bearing races during reassembly that will seal the bearings in addition. Wipe off excess grease after reassembly.

Observe the correct order of assembly and place the lower bearing on the crown race. The bevel of the cartridge bearing's outer ring, normally, shows in direction of the head tube, whereas the bevel of the cartridge bearing's inner ring shows to the crown race. Slide the AX-Lightness and engage fork from below into the head tube of the frame.

Slide the upper bearing that is greased on the outside, the upper bearing cone, the bearing cover and the spacers completely on the steerer tube until the AX-Lightness and engage fork is mounted almost free of play. Make sure the clamping area of the stem is absolutely free of grease and apply AX-Lightness and engage carbon assembly paste. Slide the stem on the steerer tube and plug in the top cap **(g)**. Adjust the headset, as described in chapter **"Adjusting the Aheadset®-headset"**.

The top clamping area of AX-Lightness and engage carbon steerer tubes must remain free of grease.

CRANK SYSTEMS - PEDALS


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d

Cranksets and chainrings

General notes on mounting and compatibility

Due to the huge number of frame standards, mounting a crank system **(a–d)** into a bicycle frame is a job for a skilled mechanic. The actual work steps vary according to the frame and cannot be described in a single user manual.

For this reason, the first mounting is a job best left to your AX-Lightness and engage dealer! If you want to try it by yourself, be sure to observe the following chapters.

Also read through the mounting instructions of your frame and further add-on parts and observe them. If you have any questions, please contact your AX-Lightness and engage dealer, call our service centre on +49 (0)9270 / 91513-0 or send us a mail to info@ax-lightness.de or info@engage-bikes.de

Technical data:

Crank shaft: BB 386 Evo or BSA bearing with AX-Lightness bearing cups	
Bolt circle road racing bicycle:	110 mm
Recommended chain line road racing bicycle:	43.5-44 mm
Pedal thread:	9/16" x 20 TPI

Recommended torque values:

Chainring bolts	6-8 Nm
Crank fixing bolt	44-50 Nm
Pedal axles	34 Nm
BSA/BSC bearing cups	35-50 Nm
Crank arm fixing on the axle	45-50 Nm

⚠ All bolt torque values are only reference values. Also observe the instructions given by the manufacturers of the add-on parts used. If you have any questions, contact your AX-Lightness and engage dealer.

Mounting the chainrings

AX-Lightness cranks are delivered without chainrings, which allows you to determine the number of teeth and the colour you want. If you want to mount chainrings, contact your AX-Lightness and engage dealer. He will procure you the matching components.

Check the correct mounting position of the chainrings on the AX-Lightness and engage crank **(e)**. Make sure the safety bolt of the big chainring is behind the crank arm. Make sure the smaller chainrings are mounted in a way that the chain can change easily between the chainrings (shifting ramps) and is not jammed between these and the inner side of the crank arm. It is therefore crucial to observe the orientation. The chainrings are often marked with arrows or characters.

Further indications are the counter bores for the chainring bolts. The crank bolts are typically sunk in the counter bores so that they hardly stand over.

Insert the greased hollow nut from the rear **(f)**. Tighten the greased fastening bolt by hand. Check the true running of both chainrings before tightening them crosswise by using a torque wrench to a torque value of 6 to 8 Nm **(g)**.

If the hollow nut rotates, keep it tight with a common special tool or, depending on the model, with an Allen key **(h)**.

Mounting the cranks in BB386 Evo or BB30 bottom bracket. Standard is history, today's bicycle frame structures come with all possible sorts of bottom bracket shells. In principal, there are three different bearings they can be combined with, i.e. deep groove ball bearings which are inserted directly into the shell, bearings in threaded bearing cups and bearings with un-threaded bearing cups for press-fit.


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h


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b


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d

AX-Lightness cranks can be mounted with the standard shaft into the BB 386 Evo bottom bracket shell.

With a special shaft, they can also be mounted in standard BB 30 shells.

If you have any questions regarding compatibility, please contact your AX-Lightness and engage dealer, call our service centre on +49 (0)9270 / 91513-0 or send us a mail to info@ax-lightness.de or info@engage-bikes.de

Mounting the cranks in all bottom brackets

Mount the BB30 or BB386 Evo bottom bracket in the bicycle frame according to the manufacturers' instructions.

If you have BSA/BSC bottom bracket shells, you must mount the AX-Lightness bottom bracket first, as described in the chapter **"Mounting the bottom brackets in BSA or BSC bottom bracket shells"**.

Apply a little high-quality bearing grease onto the bottom bracket shaft **(a)**.

Insert the shaft from the crank side into the bearing until the shaft collar is in contact with the bearing **(b).** Performing this movement should be free of play, but not require any force. If it is not free of play, contact your AX-Lightness and engage dealer. It is possible that the bottom bracket shell lacks dimensional accuracy. In this case it requires a reworking with special tools, if necessary.

Apply a thin layer of high-quality grease on the spline shaft section and the crank arm bolt **(c)**. Approach the crank to the shaft and make sure the section engages accurately. Turn the bolt by using an Allen key **(d)** and observe, as the crank moves on the shaft. Turning the bolt should not require any force during the first rotations. As soon as the force you need for turning increases, the AX-Lightness and engage crank is pre-mounted.

Position the shaft locating washer on the other side **(e)** and pre-mount the left crank, as described. Carefully check whether the cranks are freely movable and make sure they do not collide with another component.

Finally, tighten both cranks to the recommended torque value **(f)**. Lightweight riders can opt for the minimum torque value whereas stronger and heavier riders should opt for the maximum torque value.

Finish by checking carefully once again whether the cranks are easily and freely movable and make sure they do not collide with another component.

Mounting the bottom brackets in BSA or BSC bottom bracket shells

AX-Lightness bearing cups are designed for BSC threads (identifier BC 1.37 x 24).

Apply some grease to the bottom bracket shell in the frame and to the threads and contact surfaces of the bearing cups **(g)**.

Start by turning in the right side (drive side) three to four turns by hand. Please note that the right side has a left-hand thread. Turn in the bearing cups anticlockwise. Then turn in clockwise the cup on the left side. Once the cups are turned in on both sides by several rotations, position the AX-Lightness special tool **(h)** on the drive side to tighten them to the required torque value with a torque wrench. With 35 to 50 Nm the bolted connection of the bottom bracket requires the highest torque value of all bolts on the bicycle. Therefore, be sure to use a torque wrench in this area, too.

Tighten the second cup, as well. Check whether the cups are accurately seated in the shell. If the cups are not in full contact, the bearing shell thread must be re-worked and the surfaces milled to make them plane-parallel.

Mount the cranks, as described in the chapter **"Mounting the cranks in all bottom brackets".**


e


f


g


h

Dismounting the cranks

AX-Lightness cranks are fitted with an integrated extractor tool. For this reason the dismounting does not require an additional special tool.

Approach a long Allen key and release the bolts anticlockwise **(a)**.

Once the bolt is loose, you can turn it a few rotations without feeling hardly any resistance, before it comes to a stop at the outer crank cap and the resistance increases from this point on.

Continue turning by applying force. The crank will then loosen from the shaft.

Dismount the bottom bracket by using the AX-Lightness special tool, i.e. a plug tool with multi-tooth profile **(b)** engaging with the cups of the bearing cartridge. Release the left side by turning anticlockwise to begin with. The drive side is, however, released clockwise **(c)**! If necessary, secure the tool against shifting with a through going bolt including big washer.

If you don't have such a bolt with washer, we recommend that you ask a helper to secure the tool during dismounting.

Mounting the pedals and adjusting the crank length

The first mounting and adjustment of the pedals are jobs best left to your AX-Lightness and engage dealer! If you want to try it by yourself, be sure to observe the following chapters.

Also read the instructions of the pedal manufacturer.

Before mounting the pedals make sure the pedal thread matches the crank. AX-Lightness and engage crank systems are currently available with the standard thread 9/16" x 20 TPI. If you are in doubt, ask your AX-Lightness and engage dealer for advice.

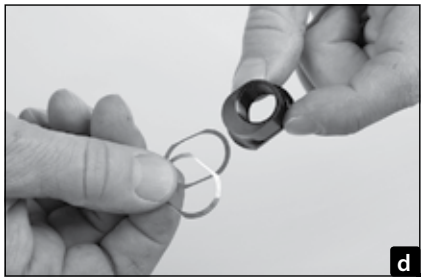
With a pre-defined crank length on engage cranksets, you can mount the pedals directly.

With AX-Lightness Morpheus cranksets the crank length is adjusted with special inserts **(d)**.

The inserts with a central thread have a crank length of 172.5 mm. The thread inserts allowing an asymmetrical position have a crank length of 170 mm with the thread being positioned closer to the fastening and a length of 175 mm with the thread being adjusted towards the end of it.

Slide the thread component from the rear into the crank arms **(e)** until you have reached the desired position. Mount the matching counter plate accurately to the front **(f)**.

Make sure you mount the inserts of both cranks in the same position.



Mounting the pedals

Apply high-quality mounting grease to the threads in the crank arms, the pedal threads **(a)** as well as to the contact surface of the pedal axles.

Position the axle of the right pedal with your fingers and screw it in clockwise by a few turns **(b)**, before tightening it with a pedal wrench **(c)** or a long 15 mm open-ended wrench.

The left pedal has a left-hand thread. Position the axle also with your fingers and screw it in anticlockwise. Tighten the pedal subsequently with the pedal wrench or a long, 15 mm open-ended wrench.

The recommended torque value is 34 Nm.

If you have AX-Lightness Morpheus cranks, check whether the pedals are mounted absolutely free of play in the crank arms.

If they are not, you must dismount the pedals and the thread inserts completely. Slide the enclosed thin intermediate rings **(d)** on the thread and re-mount the pedals, as above described.

If the pedals still have play in the crank arm, even with two intermediate rings, contact your AX-Lightness and engage dealer, call our service centre on +49 (0)9270 / 91513-0 or send us a mail to
info@ax-lightness.de or
info@engage-bikes.de

When dismounting the pedals, e.g. for taking your bicycle with you on the plane, remove the thread inserts from the cranks and pack them separately into a bag.

Do not exceed the indicated torque value! Check the torque value after the first 100 to 300 km (60 to 180 miles) and every 2,000 km (1,200 miles) thereafter. Loose bolts or pedal axles can result in an accident!

HANDLEBARS – STEM

General notes on mounting and compatibility

Before you start mounting make sure the stem you have chosen has a clamping diameter matching the AX-Lightness and engage handlebars. The same applies to both the stem and the steerer tube.

Our AX-Lightness road racing handlebars have a clamp diameter of 26.0 mm.

The clamp diameter of our AX-Lightness mountain bike handlebars is 25.4 mm **(a)**.

The clamp diameter of all engage handlebars is 31.8 mm **(b)**.

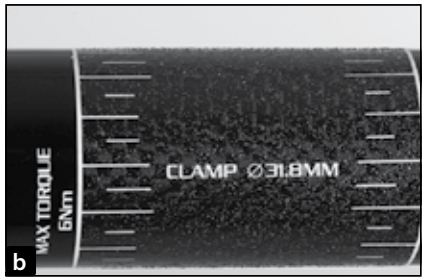
Most steerer tubes measure 1 1/8", which corresponds to 28.6 mm. The AX-Lightness and engage stems are designed for these clamp diameters.

Only use brake levers and shifters with symmetrical clamps **(c)**.

The same applies to bar ends on handlebars designed to be fitted with bar ends. Bar ends must have a symmetrical clamp, as well. Be sure to mount bar ends only on handlebars approved for bar ends. Observe the product descriptions and type labels on the handlebars.

Do not mount aero handlebars, also referred to as clip-ons, on standard AX-Lightness and engage handlebars. If you need aero handlebars, get in touch with us. You will obtain from us custom-made handlebars with special reinforcements.

a



b

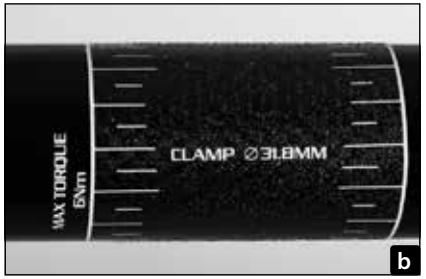

c

Asymmetrical clamps or handlebar grips fastened with a single bolt etc. can damage AX-Lightness and engage handlebars.

Make it a rule to use AX-Lightness carbon assembly paste to achieve maximum clamping with minimum torque values.

If you mount new AX-Lightness and engage handlebars to an existing stem, check the old handlebars carefully for scratches, abrasion marks and notches after removal. Damage in the clamping area indicates insufficient processing or defective design of the stem in these areas.

a



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Mounting AX-Lightness and engage Aheadset®-stems

Many AX-Lightness **(a)** and engage stems can be mounted in either vertical orientation. These flip-flop models allow handlebars to be positioned at two different heights by simply inverting the stem.

Make sure the AX-Lightness and engage stem and fork steerer tube always have matching or compatible clamp diameters **(b)**!

If you fit a new AX-Lightness and engage stem on a fork with carbon steerer tube, check the clamping area of the fork for notches or abrasion marks. In case damage is visible, ask your AX-Lightness and engage dealer whether the fork must be replaced.

Make sure the clamping areas are absolutely free of grease, especially when the clamping surfaces are made of carbon. Use AX-Lightness carbon assembly paste **(c)** on the clamping areas to optimize the fixing.

Grease the threads and the connecting surfaces/ heads of the steerer clamp bolts **(d)**. Keep lubricants away from clamping surfaces.

Slide the AX-Lightness and engage stem on the fork steerer tube **(e)**. It must fit snugly on the fork. Do not fit stems which have play on the steerer tube.

Depending on the steerer tube length and the desired stem position, insert spacers **(f)** on the fork steerer above the upper cover of the headset, and/ or above the stem. You can stack them up to a maximum height of 30 mm.

Spacers are available in different heights. You have installed the correct number of spacers, when the steerer tube ends 2 mm below the top edge of the stem.

Make sure the stem provides sufficient support for the steerer tube and the steerer tube ends 2 mm at the most below the top edge of the AX-Lightness and engage stem. This ensures a reliably clamping when tightening the clamping bolts of the steerer tube clamp to the prescribed torque value.

If the preferred height of your AX-Lightness and engage stem results in a deeper position of the stem on the steerer tube, the steerer tube projects from the stem. To check whether you have found the proper position, slide spacers on the steerer by making sure that the steerer tube ends 2 mm below the top edge of the stem. After the test ride the steerer tube of a carbon fork must be shortened.

For proper load distribution during clamping the clamp bolts of AX-Lightness and engage stems are designed to be screwed in in a determined direction **(g)**. Be sure not to change the screw-in direction.

Tighten the stem bolts only a little, if you intend to mount the handlebar right afterwards. The headset has to be adjusted afterwards **(h)** (see chapter **"Adjusting the Aheadset®-headset"**).

AX-Lightness and engage stems are flip-flop models, i.e. they allow an upward or downward oriented mounting.

The space between the top of the steerer tube and the upper edge of the AX-Lightness and engage stem should not exceed a maximum of 2 mm. The space between the top of the steerer tube and the upper edge of the AX-Lightness and engage stem should not exceed a maximum of 2 mm.

Observe the maximum spacer height of 30 mm and do not insert permanently more than 5 mm of spacers above the stem, if your fork steerer tube is made of carbon.


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Mounting AX-Lightness and engage handlebars

Apply AX-Lightness carbon assembly paste in the area of the clamping **(a+b)** on the AX-Lightness and engage handlebars as well as on the stem.

Position the stem clamp in the middle of your new AX-Lightness and engage handlebars **(c)** so that the handlebars extend the same distance from the stem on each side. If the handlebars do not slide easily into the stem clamp or if there is play between the two components, ask your AX-Lightness and engage dealer whether both components are compatible.

Mountain bike handlebars are normally mounted with the sweep supporting a natural ergonomic hand position, i.e. bent slightly rearward. The handlebar position is correct when your wrists are relaxed and your elbows not flared out too much.

In the case of road racing bicycles the straight piece of the drops should be in parallel to the ground or point with the ends slightly downwards.

Tighten the greased bolts of the stem faceplate with your fingers by a few turns **(d)**. Do not apply grease on the clamping surfaces. Tighten the bolts of the AX-Lightness handlebars with a 3 mm Allen key and the bolts of the engage handlebars with a 4 mm Allen key until the clamping slots are identical in width on all sides.

If you have a four-bolt stem, the upper and lower clamping slots must be identical in width and parallel in addition **(e)**.

Finish by checking the position of the handlebars. Tighten the fixing bolts evenly in a cross pattern, i.e. alternately and in small increments to the minimum limit of the recommended torque values by using a high-quality torque wrench with a 3 mm hexagon bit socket in the case of AX-Lightness handlebars **(f)** and a 4 mm hexagon bit socket in the case of engage handlebars **(g)**. If you have a four-bolt stem, tighten the bolts in a cross pattern.

The recommended maximum torque value for the AX-Lightness Zeus stem is 3-4 Nm. Always use a high-quality torque wrench and observe the torque value indicated on the component in case of doubt.

Check the brake lever/shifter or the brake grips for burrs and sharp edges **(h)**. Do not use shifters or brake levers with burrs or sharp edges to prevent your AX-Lightness and engage handlebars from damage or notches.

Components that are affected by burrs or sharp edges should be checked by your AX-Lightness and engage dealer. They will see, whether this is a problem that can be solved or whether the component has to be replaced.

Loosen clamping bolts completely to ensure clamps are open all the way before sliding the shifters and brake levers onto the handlebars. In the case of some mountain bike brake grips a part of the clamp can be folded upwards or removed.


e

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In the case of road racing bicycle brake lever/shifter units (Dual Control, Ergopower or DoubleTap) dismount the clamp completely from the unit **(a)**.

Carefully slide the clamp on the handlebars **(b)** and subsequently re-mount the unit to the clamp.

Start tightening the clamping bolts slightly, so that the unit can still rotate freely. Bring the brake lever/shifter units to the desired position.

As soon as the unit is in the desired position, apply some AX-Lightness carbon assembly paste in the area of the clamping.

Tighten the bolts just enough to secure the brake lever/shifter units **(c+d)**. Be sure not to exceed the prescribed torque value, as the brake levers will otherwise damage the AX-Lightness and engage handlebars.

Never rotate the units on the handlebars after you have tightened the clamping bolts. Otherwise you will scratch the surface and mar the finish. In addition you run the risk of damaging the material.

Never shorten AX-Lightness and engage mountain bike handlebars by cutting off the ends, as the handlebars are generally reinforced in the clamping areas of the shift/brake lever units. In addition, you would cut off the bar end reinforcements. These reinforcements are designed to withstand the forces occurring in these areas.

Read through the user manuals of all components of the other manufacturers before you follow the above instructions.

Do not shorten AX-Lightness and engage handlebars, as this would damage the handlebars and result in a severe accident during use. Any modification to an AX-Lightness and engage carbon component will void the warranty.

Adjusting the Aheadset®-headset

Adjusting the headset is a job for a skilled bicycle mechanic. Have this work solely done by an authorized AX-Lightness and engage dealer. If you intend to do the adjustment on your own, read the chapter **"Fork – Headset"** or the user manual of the headset manufacturer first and note that you need special tools, e.g a high-quality torque wrench.

Release the clamping bolts on the side of the AX-Lightness and engage stem by two to three turns **(e)** without unscrewing them entirely.

The Allen bolt located in the top cap is intended to re-adjust the bearing play **(f)**. Turning the bolt clockwise removes play, as the stem is pressed downward on the bearing; turning the bolt anticlockwise increases the play. In case there is bearing play, tighten the adjusting bolt by another quarter or half a turn.

Check the headset for play **(g)** as described in the general user manual of your bicycle. Do not overtighten the headset; otherwise there is the risk of headset failure.

Do not overtighten the top Allen bolt. It is intended for adjustment! Tighten the bolt carefully in quarter-turns and check the play regularly.

Once the play is properly adjusted, align the AX-Lightness and engage stem in the direction of motion. Check the alignment of frame and stem with the front wheel from the top **(h)**. The AX-Lightness and engage handlebars should be at right angle to the direction of motion.

With carbon steerer tubes, make sure the inside of the tube is supported by a suitable expander-cone mechanism for adjusting the headset. AX-Lightness and engage recommend the gumgum from Tune for AX-Lightness forks.

Be sure to observe the chapter **"Fork – Headset"** or the instructions given in the user manual of the fork manufacturer before tightening the stem.

Start by tightening both clamping bolts alternately and then by using a high-quality torque wrench **(a)**. Start with a standard torque wrench and a minimum torque value of 3 Nm.

Check the secure clamping of the AX-Lightness and engage stem by holding the front wheel between your knees and trying to turn the handlebars relative to the front wheel **(b)**.

In case the stem clamping is not tight enough, increase the torque value to 4 Nm.

In case the AX-Lightness and engage stem is still not tight enough, dismount the stem and once again apply some AX-Lightness carbon assembly paste **(c)** on the fork steerer tube and the inside of the stem.

If the AX-Lightness and engage stem cannot be tightened on the fork steerer tube to a tightening torque of 4 Nm, in spite of the AX-Lightness carbon assembly paste on the clamping surfaces, stem and fork are incompatible.

Replace the AX-Lightness and engage stem by a matching model or ask your AX-Lightness and engage dealer for advice.

After adjusting the headset check the tight clamping of the stem by holding the front wheel between your knees and trying to turn the handlebars relative to the front wheel. A loose stem can lead to an accident!

AX-Lightness forks in combination with AX-Lightness stems can also be used without expander. Dismount in this case the expander after having adjusted the headset. The maximum torque value of the stem bolts is 4 Nm.

Road racing bicycle – Adjusting the handlebars

In the case of road racing bicycles the straight piece of the drops should be in parallel to the ground or point with the ends slightly downwards **(d)**. If it is not, release the handlebar clamping bolts by two to three turns and re-position the AX-Lightness and engage handlebars.

Re-tighten the clamping bolts with a 3 mm Allen key until the clamping slots of the stem faceplate are identical in width on all sides **(e)**.

If you have a four-bolt stem the upper and lower clamping slots must be identical in width and parallel in addition.

Finish by checking the position of the AX-Lightness and engage handlebars. Tighten the fixing bolts evenly in a cross pattern, i.e. alternately and in small increments to the minimum limit of the recommended torque values by using a high-quality torque wrench **(f)** with a 3 mm hexagon bit socket (AX-Lightness) handlebars and a 4 mm hexagon bit socket (engage) handlebars.

If you have a four-bolt stem, tighten the bolts in a cross pattern.

The recommended maximum torque value for the AX-Lightness Zeus stem is 3-4 Nm. Always use a high-quality torque wrench and observe the torque value indicated on the component in case of doubt.

Check the tight fit of the AX-Lightness and engage handlebars in the stem by trying to turn them downwards **(g)**. You should not be able to rotate the handlebars. Never exceed the torque value recommended by the manufacturer.


a


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In case the handlebars are not tight, check that each bolt was tightened to the recommended torque value (4 Nm for AX-Lightness stem clamping bolts) **(a)**. If each bolt was tightened to a torque value of 4 Nm and the clamping force is still insufficient, release the bolts, remove the handlebars from the stem and apply another coat of AX-Lightness carbon assembly paste to the clamping areas **(b)**.

Retighten each bolt individually **(c)** to a torque value of 4 Nm. If the AX-Lightness and engage handlebars are still not tight in the stem, ask your AX-Lightness and engage dealer for advice.

Check the adjustment of the brake lever/shifter units, if necessary, as described in chapter **"Mounting AX-Lightness or engage handlebars"**.

Mountain bike – Adjusting brake lever/shifter units

Release the bolt(s) of the clamps by two to three turns without unscrewing them entirely. Turn the loosened units on the AX-Lightness and engage handlebars so that they show slightly downward. Sit in the saddle and place your fingers on the brake levers **(d)**.

The back of your hands should form a straight line with your forearms. Make sure the brake lever is within easy reach of your index and middle fingers **(e)**. The first phalanx of both fingers should be able to reach around the lever without pulling it. It may be necessary that you position the brake lever and the shifter a little away from the handlebar grip **(f)**.

With your hands in the correct position adjust the shifters accordingly and tighten the clamping bolts of the brake levers and shifters to the recommended torque values.

Mounting bar ends

Bar ends **(g)** add more hand positions to your handlebar configuration. They are usually set to a position that provides more leverage and more comfort when you pedal out of the saddle.

Keep in mind that not all AX-Lightness and engage handlebars can be fitted with bar ends. Be sure to mount bar ends only on handlebars approved for bar ends. Observe the product descriptions and type labels on the handlebars. If you are in doubt, ask your AX-Lightness and engage dealer for advice.


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Mounting bar ends to AX-Lightness and engage handlebars **(a)** that are not approved for bar ends can lead to handlebar failure and result in an accident.

Check that the clamping areas of the bar ends are free of burrs and sharp edges. Do not use bar ends with burrs or sharp edges. Burrs are sharp and can cut into other components. If there are any burrs or sharp edges, contact your AX-Lightness and engage dealer. Replace the bar ends by models that are free of burrs.

Release the clamping bolts of the brake lever/shifter units **(b)** and slide them together with the handlebar grips **(c)** towards the centre of the handlebars until there is enough space to mount the bar ends. If the grips have end caps, cut them off before you move the grips.

Do not use any liquids or grease to loosen the grips; if necessary, use compressed air to loosen them.

Loosen the bar end bolts which are in most of the cases on the bottom side of the bar ends by two to three complete turns. Apply some AX-Lightness carbon assembly paste on the handlebars' clamping area and inside the bar ends.

Slide the bar ends on the respective side of the handlebars. Angle the bar ends according to your personal preference and make sure they are both at the same angle. Observe possible right/left references on the bar ends.

Retighten the bolts with a high-quality torque wrench to 3 Nm **(d)**. If the bar ends are still not tight, increase the torque value to a maximum of 4 Nm. Do not exceed the maximum torque value of 4 Nm for the clamping bolts of bar ends mounted to AX-Lightness and engage handlebars.

Always observe the maximum torque values indicated on the components. The bottom value is the maximum torque value.

If a tight fit of the bar ends on the handlebars cannot be achieved in spite of using AX-Lightness carbon assembly paste on the contact surfaces, the bars ends and the handlebars are not compatible. In this case replace the bar ends by appropriate models.

The interfacing clamping areas of stems, handlebars (e), bar ends, brake levers and shifters must be tightened to the prescribed torque values (f).

Mounting unsuitable bar ends to AX-Lightness and engage handlebars can lead to handlebar failure and result in an accident. Not all AX-Lightness and engage handlebars are designed to be fitted with bar ends. Ask your AX-Lightness and engage dealer for advice.


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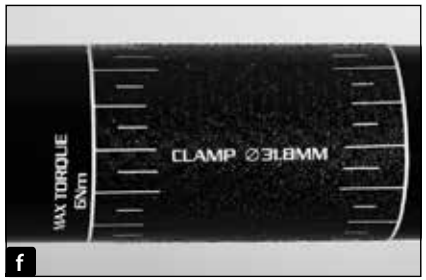

f

Adjusting the handlebar height

Both the handlebar height and the stem length determine how much your upper body will be inclined forward. Lowering the AX-Lightness and engage handlebars gives the rider a streamlined position and brings more weight to bear on the front wheel. An excessively low handlebar position may prove uncomfortable and can strain wrists, arms, upper body and neck. Seek the assistance of a qualified AX-Lightness and engage dealer, especially if you experience pain or discomfort after set up and use.

Aheadset®-stems

Readjusting the Aheadset® by using spacers

On bicycles using a threadless headset system, also referred to as Aheadset®-system, the stem is an integral part of the headset **(a)**. To modify the seating position the stem can be dismounted and re-mounted **(b)**. Subsequently, the headset must be readjusted. Observe the chapters **"Mounting AX-Lightness and engage Aheadset®-stems"** and **"Adjusting the Aheadset®-headset".**

The vertical position of the handlebar position is determined by the arrangement of the spacers **(c)**. In the case of flip-flop models it is also possible to reverse the stem.

Unscrew the bolt at the top of the fork steerer tube which serves to adjust the bearing preload and remove the Ahead cap. Release the bolts on either side of the stem by two to three turns **(d)** and remove the stem from the fork **(e)**. Now you can remove the spacers. Reposition the spacers on the steerer tube above and below the stem in order to position the AX-Lightness and engage handlebars at the desired height or remove the handlebars and bring the stem in reverse position.

If you want to reduce the number of spacers **(f)**, you have to shorten the steerer tube. This shortening is irreversible. Shortening the steerer tube is a job for the AX-Lightness and engage dealer. Have this work performed only after you have found the ideal position. Instead of shortening the steerer tube you have also the option to modify the arrangement of the spacers. For a test ride place the equal number of spacers you have removed from below the stem above the stem and vice versa.

Mount the AX-Lightness and engage components, as described in the chapters **"Mounting AX-Lightness and engage Aheadset®-stems", "Mounting AX-Lightness or engage handlebars"** and **"Adjusting the Aheadset®-headset"** and check finally the secure seat of the components **(g)**.

Keep in mind not to position more than 30 mm spacers below the AX-Lightness and engage stem.

Have the fork steerer tube shortened immediately, if the stacking height of the spacers above the stem exceeds 5 mm.

Grips and bar tape

Grips **(a)** and bar tapes **(b)** not only provide comfort, but also have a very important secondary function: they ensure that your hands' movements communicate clearly with the steering components.

Make sure the grips and the bar tape are in good, functional condition. Replace worn through or extremely dirty grips and bar tapes immediately. At least once a year it is time for them to be checked or replaced.

Mounting the grips

For a reliable fit without play grips must be mounted only on AX-Lightness and engage handlebars that are free of oil and grease.

In the case of **locking grips (c)** check that clamping is realised by a clamp and not by a bolt acting on the handlebars. Grips with bolt locking can be slided easily on the handlebars. Keep in mind that the clamping mechanism is at the end of the handlebars, if there is only a single one. Slide the grip into the correct position on the handlebars and tighten the bolts just enough to ensure a tight fit of the grip. Never exceed the maximum torque value of 3 Nm.

All other grips adhere to AX-Lightness and engage handlebars due to internal stress and friction between bars and grip. The easiest way to mount the grips is with compressed air. Inflate the grips with air and slide them onto the handlebars. If you don't have compressed air, please contact your AX-Lightness and engage dealer to do the mounting.

We strongly advise not to use slip agents, such as hairspray etc., as they can cause the grips to loosen during use.

All types of grips that are designed with open ends should be fitted with the enclosed plugs **(d)** (into the ends of the handlebars). This will avoid or at least reduce potential damage to the handlebars and injuries in the case of an accident.

Make sure during the mounting that the AX-Lightness and engage handlebars are free of lubricants and do not use any liquids or chemical fluids for mounting.

Do not ride your bicycle, when the handlebar grips are not tight. If necessary, replace them by suitable, i.e. tight, models.

Wrapping the bar tape

Clean the AX-Lightness and engage handlebars of any dirt, adhesive residues or grease.

Start wrapping the bar at the bottom **(e)**, i.e. at the open end of the drop. The first wrap around the bar should be positioned that half of the tape is overlapping the end of the bar.

Proceed inward/upward with the tape diagonal and partly overlapping the previous wrap, and so on **(f)**. Hold the tape under tension during the complete wrapping process and remove the paper backing from the adhesive as you go.

Position a short piece of bar tape on the rear side of the brake lever and over its clamp around the AX-Lightness and engage handlebars so you will not have an "unwrapped area" as you wrap past the lever **(g)**. Continue wrapping the tape until you reach the bulge/clamp area. Finish by taping the final wrap of the bar tape with insulating tape.

Tuck the overlapping bar tape you left at the beginning into the open end of the bar and insert a plug **(h)**. Repeat the entire process on the other side.

Inform yourself at your AX-Lightness and engage dealer about the different types of bar tapes and grips.

FRAMESETS – ASSEMBLY INSTRUCTIONS AND TECHNICAL DATA


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General notes on mounting and compatibility

AX-Lightness and engage offer the high-quality carbon framesets **(a+b)** as bare frames for individual fitting with components.

The person completing and mounting the add-on parts must therefore ensure that all components are compatible and properly mounted **(c+d)**. There is a vast variety of available add-on parts, making it impossible for AX-Lightness and engage to cover every conceivable option in this manual.

AX-Lightness and engage cannot be held responsible for any component combination possible.

AX-Lightness and engage recommend not to combine AX-Lightness and engage components with other components, wherever possible.

We strongly advise you to carefully read the manufacturers' operating instructions of the other components, as well. Failures in selecting bicycle components can, in principle, result in your AX-Lightness and engage bicycle being unsafe. We therefore advise you to have your bicycle assembled by a skilled mechanic in a master workshop. For your own safety, never do work on your bicycle unless you feel absolutely sure about it.

Have your AX-Lightness and engage bicycle assembled by an AX-Lightness and engage dealer!

Depending on the experience and/or skill of the person doing the work this manual may need to be supplemented. For some jobs you may require additional (special) tools, e.g. special extractor tools or supplementary instructions.

Do not clamp the die AX-Lightness and engage frame into an assembly stand by its tubes! This could cause damage to the thin-walled tubes. First mount a sturdy aluminium seat post and use this to clamp the frame, or use an assembly stand which holds the AX-Lightness or engage frame at three points from inside or which holds the fork and the bottom bracket shell.

AX-Lightness and engage frames are delivered ready for assembly, i.e. with threads cut and bearing seats and seat tube prepared. There is no need for any machining on the frame. Do not modify the AX-Lightness and engage frame or any of its attachments, e.g. the adjustable cable guides etc., by filing, boring or the like.

Mount all AX-Lightness and engage add-on parts, e.g. stems on forks with carbon steerer tubes **(e)** and all posts in carbon frames **(f)** by using high-quality AX-Lightness carbon assembly paste. This will ensure a reliable hold. Do not use any grease except from the threads and bearing seats **(g)**.

Before mounting the AX-Lightness and engage headset and the fork read the chapter **"Fork – Headset"** in this AX-Lightness and engage manual.

Tighten the bolts carefully by approaching the maximum permissible torque in small steps. Check the secure seat of the AX-Lightness and engage components, as described in the relevant chapters **(h)**.

For parts with no torque range given, tighten the bolts gradually to the maximum torque value and check in between regularly the reliable fit of the AX-Lightness and engage component.


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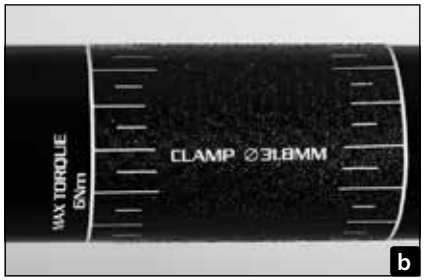

b

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Whoever assembles an AX-Lightness and engage bicycle frame from a bare frame carries the responsibility for ensuring that the components are selected and mounted in accordance with the manufacturers' guidelines, generally accepted standards and the state-of-the-art in science and technology. If you have any questions as to the compatibility of individual parts with the frame, please contact your AX-Lightness and engage dealer, call our service centre on +49 (0)9270 / 91513-0 or send us a mail to info@ax-lightness.de or info@engage-bikes.de

All carbon fibres of the AX-Lightness and engage frame were arranged in a way to meet the strength specifications for those directions of force to which they are normally subjected. The cable stops must only be subjected to forces as they are exerted by the gear or brake cable. Do not pull on them at an oblique angle or against the direction of the cable, i.e. away from the frame, e.g. in an attempt to prestretch the cables. This could otherwise cause damage to the AX-Lightness and engage frame.

On the AX-Lightness and engage components the torque values are printed directly on them or on stickers **(a–c)**. Be sure to observe these specifications. Also observe the assembly instructions in the relevant chapters of this manual and the assembly instructions of the other components' manufacturers.

Technical data – Connecting dimensions – Torque values

Headset
All AX-Lightness and engage frames are delivered with fully mounted bearing cups and an integrated headset.

Bottom bracket (d)
AX-Lightness frames are delivered with deep groove ball bearings (industrial bearings) directly mounted into the frame. These are designed for the 30 mm bottom bracket shaft standard.

We recommend that you use an AX-Lightness crankset.

engage frames have the BB386 Evo bottom bracket size. All usual cranks designed for this standard fit into the frame.

We recommend that you use an AX-Lightness crankset.

Observe the torque specifications of the bottom bracket or crank manufacturers.

Rear frame width (e)
All road racing frames are for an axle width of 130 mm and quick-release axles of 10 mm.

Replaceable derailleur hanger (f)
On AX-Lightness frames the derailleur hangers are glued and can only be replaced in our company.

All engage frame models are delivered with a sufficiently fastened replaceable derailleur hangers. Observe the torque value of 2.5 to 3 Nm. Do not exceed the maximum torque of 3 Nm.

Bottle cage (g)
Observe the torque value of 2 to 4 Nm. Do not exceed the maximum torque of 4 Nm.


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Cable stops
Tension the cable stops on the AX-Lightness and engage frame according to the force progression only in direction of the gear or brake cable routing. Forces acting at an oblique angle or against the direction of the cable routing can cause damage to the AX-Lightness and engage frame.

Seat post
AX-Lightness and engage recommend using frames with AX-Lightness or engage seat posts **(a)**. The components fit and function as integrated whole and will allow you to achieve optimum performance.

In case you want to mount the seat post of another manufacturer after all, make sure it has the same nominal diameter as the frame's seat tube **(b)**. You should be able to slide the seat post easily into the frame without pressing or turning. A mismatch between frame and seat post can cause failure of the AX-Lightness and engage seat post.

An AX-Lightness and engage carbon seat post and an AX-Lightness and engage carbon seat tube must be free of oil and grease. Clean the seat tube, if necessary.

Once you have found the desired saddle height, mark the position of the seat post e.g. with an adhesive tape. Pull the seat post out subsequently. Apply a thin layer of AX-Lightness carbon assembly paste inside the seat tube and outside the seat post in the area of the clamping **(c)**. Re-mount the seat post and bring it into the desired position.

Do not overtighten the seat post binder bolt **(d)**. Observe the notes given in the chapter **"Adjusting the saddle to the correct height"** and also consider the manuals of the component manufacturers of another brand.

Overtightening may cause the failure of an AX-Lightness and engage seat post, resulting in an accident and/or injury of the rider.

The diameter of all AX-Lightness and engage seat tubes is designed for seat posts at a nominal diameter of 27.2 mm **(e)**.

AX-Lightness and engage recommend using solely AX-Lightness or engage seat posts with the frames.

Use special AX-Lightness carbon assembly paste **(f)** to achieve maximum clamping of the AX-Lightness and engage seat post with minimum torque values.

Even a slight mismatch between seat post and seat tube diameter can lead to a rupture of the AX-Lightness and engage frame or a carbon seat post. This can result in an accident or injury to the rider.

Never grease AX-Lightness and engage carbon seat posts or seat tubes and frames.

Slide your AX-Lightness and engage seat post into the seat tube beyond its minimum mark and make sure its end reaches beyond the top tube **(g)**. Never ride your AX-Lightness and engage bicycle with the minimum mark of the seat post being visible or when the post is not clamped in the area marked with UD-fabric.


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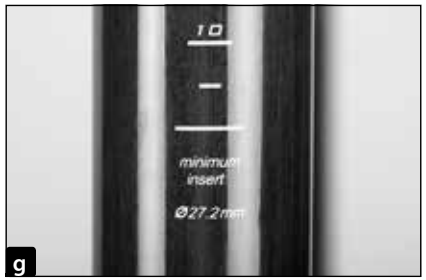

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SEAT POSTS – SADDLES


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Seat posts

General notes on mounting

Make sure your new AX-Lightness and engage seat post has the same diameter as the seat tube of your frame.

The AX-Lightness seat post Europa (a) is available with the nominal diameters:
27.2 mm, 30.9 mm, 31.6 mm and 34.9 mm

It is available in the following lengths:
L1 = 220 mm (7-14 cm extension length)
L2 = 290 mm (13-20 cm extension length)
L3 = 350 mm (19-26 cm extension length)
L4 = 400 mm (24-31 cm extension length)

The AX-Lightness seat post Daedalus (b) is available with the nominal diameters:
27.2 mm, 30.9 mm and 31.6 mm

It is available in the following lengths:
L1 = 260 mm (11-18 cm extension length)
L2 = 320 mm (17-24 cm extension length)
L3 = 370 mm (22-29 cm extension length)
L4 = 410 mm (25-32 cm extension length)

engage seat posts (c) are available with the nominal diameters:
27.2 mm and 31.6 mm

They are all 400 mm long.

Measure the AX-Lightness **(d)** and engage seat post as well as the seat tube **(e)** of the frame. The difference between the (bigger) inner diameter of the seat tube and the (smaller) outer diameter of the seat post should be between 0.05 and 0.1 mm.

Before mounting a carbon seat post on the frame make sure the seat tube is absolutely free of sharp edges and burrs. If necessary, have the seat tube cleaned and deburred by a skilled mechanic.

If you have an AX-Lightness or engage carbon seat post, the seat tube must be absolutely free of lubricants no matter what material it is made of. However, if you have a road racing machine or the like, where you don't need to change the saddle height during the race, use special AX-Lightness carbon assembly paste inside the seat tube **(f)** to achieve a tight clamping.

If your AX-Lightness and engage seat post has a suitable diameter and is free of burrs, slide it gently into the seat tube. Do not insert it deeper than necessary into the seat tube to prevent the still visible surface of the AX-Lightness and engage seat post from being damaged.

You should be able to insert the AX-Lightness and engage seat post easily into the frame without pressing or turning. It must be, however without play and should not move from one side to the other when inserted.

Slide the AX-Lightness and engage seat post into the seat tube until the binder clamp of the frame is around the area reinforced with UD-fabric (AX-Lightness) **(g)** or marked with the scale (engage) **(h)**.

Tighten the binder bolt or close the quick-release (read the chapter **"How to use quick-releases of seat post clamps"**) until the seat post no longer moves when you mount the saddle, as described further below, and check the saddle height.

A mismatch between frame and seat post can cause failure of the AX-Lightness and engage seat post and result in an accident and possible injury to the rider.


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Make sure the clamping mechanism is always within the marked or specially reinforced clamping area and never in the saddle rail bend!

Get used to the characteristics of riding with carbon saddles and increase the friction with fabric tape, if necessary.

Saddles

The product range of AX-Lightness and engage comprises a variety of saddle models **(a+b)** which not only differ in weight, but also in terms of spring properties and proper fit.

Note that the surface of uncushioned saddles is clearly smoother than you are probably used to from your previous saddle.

To increase the friction on the saddle and hence the hold, particularly in damp conditions, we recommend that you glue a strip of standard fabric tape to the saddle.

Do not combine AX-Lightness and engage saddles with seat posts that have a sharp edged or hard support. In principal, AX-Lightness and engage recommend that you use saddles and seat posts from the same AX-Lightness and engage model series.

Be sure to only clamp the saddle within the prescribed range. AX-Lightness saddles must be clamped in the round area with the woven fabric look **(c)**. The clamping area of engage saddles is marked with a scale.

Read the chapter **"Mounting the saddle on the seat post"** to inform yourself about the correct mounting and adjustment of your AX-Lightness and engage saddle on AX-Lightness and engage seat posts.

If you mount the saddle to the seat post of another manufacturer, carefully read the mounting instructions and observe the notes given here and there. If you have any questions, contact your AX-Lightness and engage dealer.

Once the saddle is mounted check that the gap between the bottom side of the saddle cover and the top edge or the seat post bolt is 15 mm at least. This prevents the components from colliding.

Mounting the saddle on the seat post

Your AX-Lightness and engage seat post is designed for most sport saddles with a saddle rail diameter of 7 mm as well as for saddles with slightly ovalized saddle rail tubes (width 7 mm and height 9 mm) including AX-Lightness and engage saddles.

Release both clamping bolts by four to five turns for saddle mounting. Do not disassemble the entire mechanism **(d)**. Turn the two holding brackets instead and place the AX-Lightness and engage saddle in the holding cup.

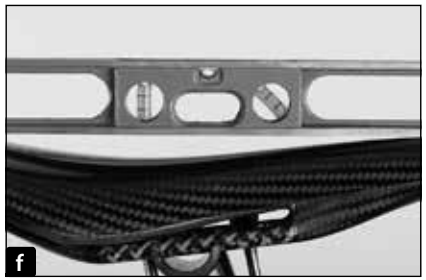
If the distance between the saddle rails is too large, do not try to force them into the clamping grooves. The clamping mechanism or the saddle rail could break and result in an accident and injuries to the rider.

Use in this case another saddle model or ask your AX-Lightness and engage dealer instead.

If the saddle is dimensioned accurately, slide it on the seat post until the saddle rail is clamped in the middle by the clamping mechanism of the seat post **(e)**. Check that the rail is clamped within the clamping range prescribed by the saddle manufacturer. AX-Lightness saddles must be clamped in the round area with the woven fabric look. The clamping area of engage saddles is marked with a scale.

Adjust the top edge of the saddle in parallel to the ground **(f)**. Tighten both bolts alternately and gradually until the saddle rails fit snugly in the recesses of the holding cup and are tightened accurately by the two holding brackets **(g)**.

In the case of the straight AX-Lightness seat posts with yoke type clamping you can perform the adjustment by using an Allen key with spherical head.

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Once you have found the desired position, tighten the two bolts alternately and gradually by using a torque wrench **(a)** to the maximum torque value indicated in Nm on the AX-Lightness and engage seat post.

In the case of the cranked AX-Lightness and engage seat posts, turn the bolt in the front either gradually by hand **(b)** or remove the AX-Lightness and engage seat post from the frame and insert a long 5 mm Allen key from the bottom and tighten the bolt.

Once the crossmember engages with the rail, pull the saddle upward and tighten the bolt. Tighten the front bolt by two to three turns more to lower the saddle nose a little. Tighten the rear bolt subsequently by using the torque wrench to the recommended torque value **(c)** which is noted on the seat post.

In case you are not sure about the correct torque value or you have no torque wrench at hand, ask your AX-Lightness and engage dealer for help. Otherwise, a too tight or too loose tightening of the bolts may lead to premature wear or breakage of the AX-Lightness and engage component during the ride and thus to an accident with possible injuries to the rider.

Check the secure clamping of the saddle on the seat post by bringing your weight to bear on it with your hands at either side of the saddle **(d)**. A loose saddle can lead to an accident.

Never exceed the torque values recommended by AX-Lightness and engage which are indicated on the components.

Before removing the seat post (e.g. when taking your bicycle along on a trip), mark the saddle height by using e.g. an adhesive strip. This will allow you to quickly find your preferred saddle height.

Rider-specific adjustments

Determination of the correct saddle height

The appropriate saddle height is a matter of how it allows you to pedal. When pedalling, the ball of your foot should be positioned above the centre of the pedal axle **(e)**.

With the pedal axle, as above described, below your foot, you should not be able to stretch your leg completely at the lowest point, the farthest distance of the pedal to the saddle, otherwise your pedalling will become awkward and you will strain your knee or other joints more than necessary. You can check the height of your saddle in the following simple way. Perform the check by wearing flat-soled shoes. Sit on the saddle and put one heel on the pedal at its lowest point. Make sure your hips remain straight when doing this. Your leg should be fully stretched in this position **(f)**.

For off-road riding it can be helpful to opt for a lower saddle height. Note that over extended periods of pedalling a deeper saddle height can result in knee pain. If your knees or hip hurt, contact your AX-Lightness and engage dealer immediately.

Make particularly sure there is enough space between your crotch and the top tube **(g)** so that you do not hurt yourself, if you have to get off your bicycle quickly.


e


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Adjusting the correct saddle height

To adjust the saddle height loosen the binder bolt **(a)** or quick-release lever (read the chapter **"How to use quick-releases of seat post clamps"** beforehand). Release the seat post binder bolt by using a suitable tool and turn it anticlockwise by two to three turns or open the quick-release at your saddle clamping.
You can now adjust the AX-Lightness and engage seat post to the desired height.

Do not pull out the seat post too far from the seat tube and do not slide it in too deep **(b)**. The binder clamp of AX-Lightness seat posts should be positioned in the area which is reinforced with the UD-fabric (UD = unidirectional) **(c)**, the binder clamp of engage seat posts in the area marked with the scale **(d)**. The mark indicating the minimum insertion depth (min. insert) on the seat post rear serves you as additional reference point.

⚠ In the case of frames with long seat tubes which continue above the top tube, the seat post should at least reach below the height of the top tube or the rear stay! This can mean a minimum insertion length of 10 centimetres (3.94 in.) or more.

Retighten the seat post in its new position. To do so turn the seat post binder bolt clockwise or close the quick-release lever (read the chapter **"How to use quick-releases of seat post clamps"** beforehand).

You should not need high hand forces to tighten the bolts or the quick-release to achieve a suitable clamping effect. Otherwise the seat post does not match the frame.

Check the tight fit of the seat post by taking hold of the saddle at both ends and then trying to rotate the seat post inside the seat tube **(e)**. If it does rotate, gently retighten the binder bolt or the quick-release and check the seat again. Do not exceed the prescribed torque values.

If the seat post is still not tight, check whether the bolt is tightened to the prescribed torque value **(f)**. If you are in doubt about the proper torque value, read the operating instruction of the frame manufacturer or ask your AX-Lightness and engage dealer for advice.

If in spite of observing the indicated torque values the seat post clamping is still not tight, release the bolt and remove the seat post. Apply a new layer of AX-Lightness and engage carbon assembly paste **(g)** on both clamping areas. Retighten the bolt to the recommended torque value **(h)**. If the seat post is still not tight, ask your AX-Lightness and engage dealer for advice.

⚠ Do not grease the seat tube of a frame. Once greased carbon fibre may never ever be fixed in a secure and safe way again!

⚠ Do not overtighten the binder bolt or the quick-release of the seat post clamp. Overtightening can damage the AX-Lightness and engage seat post and/or frame, and result in an accident and injury of the rider.


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If your bicycle has a long seat tube which continues above the top tube, the seat post should at least reach below the height of the top tube or the rear stay! This can mean a minimum insertion length of 10 centimetres (3.94 in.) or more.

If sitting on the saddle causes you pain, e.g. because it numbs your crotch, this may be due to the saddle. Your AX-Lightness and engage dealer has a wide range of AX-Lightness and engage saddles available and can offer advice on position.

Does the leg stretch test now produce the right result? Check by moving your foot and pedal to the lowest point.

When the ball of your foot is exactly above the pedal centre in the ideal pedalling position, your knee should be slightly bent **(a)**. If it is, you have adjusted the saddle height correctly.

Check whether you can balance safely on your bicycle while sitting on the saddle by stretching your feet to the ground. If you cannot, you should lower the saddle a little, at least to begin with.

AX-Lightness seat posts are available in different lengths. Note that the maximum adjustment range is only 7 centimetres (2.76 in.). For this reason be sure to choose a matching seat post.

Do not ride your bicycle with the AX-Lightness seat post clamped beyond the area reinforced with UD-fabric and the engage seat post clamped beyond the marked scale, i.e. the minimum insertion depth marking **(b)**! The seat post could break or the frame could be damaged, which could result in an accident with injuries to the rider.

Correcting the fore-to-aft position and tilt of the saddle

The inclination of your upper body and hence your riding comfort and pedalling power, are also influenced by the distance between the handlebar grips and the saddle. This distance can be altered slightly by changing the position of the saddle rails in the seat post clamp. However, shifting the saddle rails in the seat post will also affect the pedalling, i.e. the rider's legs will reach the pedals to a greater or lesser extent from behind.

Make sure the seat of the saddle remains horizontal **(c)** as you retighten the bolt(s). The bicycle should stand on level ground while you adjust the saddle. You need to have the saddle horizontal in order to pedal in a relaxed manner. If it is tilted, you will constantly have to lean against the handlebars to prevent yourself from slipping off the saddle.

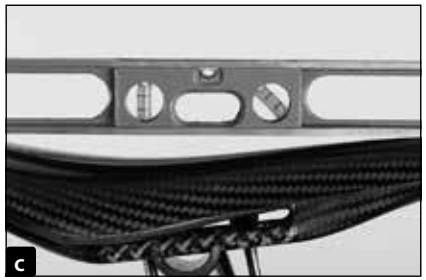
When riding off-road or with full-suspension bicycles the position can vary, i.e. the nose of the saddle can point either a little downward or upward. Ask your AX-Lightness and engage dealer.

The adjustment range of the saddle is limited. Replacing the stem allows you to make far bigger adjustments to the rider's fore-to-aft position. You may achieve differences of more than 10 centimetres (3.94 in.). In most of the cases this requires the adjustment of the Bowden and brake cable lengths – a job best left to your AX-Lightness and engage dealer!

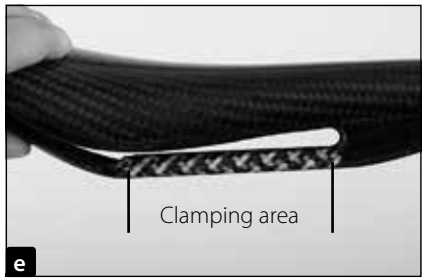
The range of AX-Lightness and engage models includes models with central positioning of the saddle on the seat post as well as models allowing a saddle set-back. Opt for the seat post matching with your proportions and your individual riding style. Ask your AX-Lightness and engage dealer.

Make sure the clamping mechanism is always within the marked **(d)** or specially reinforced clamping area **(e)** and never in the saddle rail bends of the AX-Lightness and engage saddle rails!

Release both bolts at the top of the seat post. Turn the bolts two to three turns anticlockwise at the most **(f)**, otherwise the whole assembly can come apart. Move the saddle forward or backward as desired to adjust the horizontal position. You may have to give the saddle a light tap to move it. Please observe the markings on the saddle rail.


c

d



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Having found your preferred position, make sure both brackets and the lower holding cup of the clamping mechanism fit snugly around the saddle rails **(a)** before tightening the bolts to the indicated torque value.

Tighten both bolts evenly so the saddle remains at the same angle. If you wish to lower the nose of the saddle a little, tighten the front bolt clockwise. If necessary, you may have to loosen the rear bolt a little as well. To lower the rear part of the saddle, the rear bolt has to be tightened clockwise and the front bolt to be released, if necessary.

After fastening the saddle, check whether it resists tilting by bringing your weight to bear on it once with your hands at either end of the saddle **(b)**.

The saddle clamping bolts are among the most delicate bolts of the entire bicycle. Therefore, strictly observe the recommended minimum and maximum torque values. Do not under- or overtighten. The torque values are indicated in the present operating instructions or on the components themselves.

Check the bolts by using a torque wrench once a month according to the torque values indicated in the enclosed operating instructions or directly on the components.

Poorly tightened or loosening bolts can fail. **Risk of accident!**

Mounting a saddle bag

When looking for and mounting a saddle bag, make sure it allows a secure fastening to the saddle rails **(c)**. There are some models which are connected to the seat post. Make sure the saddle bag is mounted rattle-free and does not swing around **(d)**. A swinging around saddle bag can affect pedalling and damage the saddle or the seat post surface. Ask your AX-Lightness and engage dealer for suitable models.

How to use quick-releases of seat post clamps

As the proper use of quick-releases is not common knowledge, they are again and again the reason for accidents. We recommend you to thoroughly read the following instructions and to practice the procedures as outlined.

Quick-release mechanisms essentially consist of two operative elements **(e)**:

1. The hand lever on one side of the clamp
   as fold-out lever on the seat post clamp. The clamp is released by opening the hand lever; closing the hand lever creates a clamping force.

2. The tightening nut on the opposite side of the clamp
   with which the preload on the threaded rod (quick-release axle) is set.

How to securely mount the seat post clamp

Open the quick-release **(f)**. You should now be able to read "Open" on the lever.

Move the lever back, as if to close it. Now you should be able to read "Close" on the outside of the lever. From the start of the closing movement up to about the first half of its travel the lever should move very easily, i.e. without clamping effect.

Over the second half of the travel, the force you need to move it, should increase. Towards the end of its travel the lever can only be moved by applying more force. Use the ball of your thumb **(g)**. Do not pull, however, with your fingers on the seat post or the frame, the created force could be too high.

e


f


g


a


b

Make sure the lever is fully closed. Only in this position maximum hold is achieved and it is ensured that the quick-release remains closed.

In its end position, the lever should be parallel to the bicycle **(a)**, i.e. it should not stick out. The lever must lie close to the frame so that it cannot be opened accidentally.

Finish by checking the firm hold of the saddle by taking hold of the saddle and trying to rotate it in the seat post **(b)**. If the seat post is tight in the seat tube, the saddle clamp is tight enough.

If the saddle can be moved around, re-open the quick-release and increase the preload. To do so screw the tightening nut on the opposite side clockwise by a quarter turn.

Close the lever again and check it again for tightness. Once the saddle can no longer be moved, the quick-release is tight.

Improperly closed quick-releases can make components come loose.

AX-Lightness and engage strongly recommend that you do not use seat post clamps with quick-releases in combination with carbon seat posts, as it is impossible to measure the torque value necessary for the seat post clamp. A too high clamping force can damage the carbon seat post, resulting in a component failure and thus in an accident with possible injuries to the rider.